Series 1959, No. 13

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SOIL SURVEY

Bossier Parish, Louisiana

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
LOUISIANA AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Bossier Parish will help farmers in planning the kind of management that protects their soils and provides good yields. It will assist engineers in selecting sites for roads, buildings, ponds, and other structures; assist farmers in planning management of woodlands; and add to our fund of knowledge about soils.

Soil scientists studied and described the soils and made a map that shows the kind of soil everywhere in the parish. The base for the soil map is a set of aerial photographs that show fields, woods, roads, and many other landmarks.

Locating the soils

Use the index to map sheets to locate areas on the large map. The index is a small map of the parish, on which numbered rectangles have been drawn to show what part of the parish is represented on each sheet of the large map. When the correct sheet of the large map is found, it will be seen that boundaries of the soils are outlined and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, that an area located on the map has a symbol Ac. The legend for the detailed map shows that this symbol identifies Acadia silt loam, 0 to 1 percent slopes. This soil and the other soils in the parish are described in the section "Descriptions of the Soils."

Finding information

This report has several sections for different groups of readers. The sections "Agriculture" and "Additional Facts About the Parish" will be of interest mainly to those not familiar with the parish.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of the Soils" and then turn to the sections "Capability Groups of Soils" and "Estimated Yields." In this way, they can first identify the soils on their farms and then learn how these soils can be managed and what yields can be expected. The soils are grouped by capability units; that is, groups of soils that need similar management and respond in about the same way. For example, Acadia silt loam, 0 to 1 percent slopes, is in capability unit IIIw-4. The management needed for this soil will be found under the heading "Capability unit IIIw-4" in the section "Capability Groups of Soils."

Those who need only a general idea of the soils can refer to the section "General Soil Areas." This section tells briefly about the principal patterns of the soils, where they are located, and how they differ from each other.

Soil scientists and others interested in the nature of soils will find information about how the soils were formed and how they are classified in the section "Origin and Classification of Soils." Other data of interest are in the section "Laboratory Studies."

Those who are interested in growing trees will find, in the section "Woodlands," the suitability of the soils for the production of pine. Those soils not listed in woodland suitability groups are not considered suitable for pines but may be used to grow hardwood trees.

Engineers and builders will find information that will assist them in the section "Engineering Properties of Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

The "Guide to Mapping Units, Capability Units, and Woodland Suitability Groups," which is at the back of the report, shows the reader where information about each particular soil can be found in the report.

Making a farm plan

For the soils on your farm, compare your farm practices and yields with those given in this report. Look at your fields for signs of erosion or poor drainage. This survey will aid you in planning the best use of each area of your farm, but it is not a plan of management for your farm or any other farm in the parish.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of the staff of the Louisiana Agricultural Experiment Station and others familiar with farming in your parish can help. The Dorcheat Soil Conservation District can arrange technical help for you.

* * * * *

This soil survey was made as a part of the technical assistance furnished by the Soil Conservation Service to the Dorcheat Soil Conservation District. Fieldwork for the survey was completed in 1959. Unless otherwise indicated, all statements in the report refer to conditions in the parish at the time the fieldwork was in progress.

Cover pictures: The agriculture of Bossier Parish is based on cotton, cattle, and woodland products.

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SOIL SURVEY OF BOSSIER PARISH, LOUISIANA

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BOSSIER PARISH, in the northwestern part of Louisiana (fig. 1), has a total land area of about 538,240 acres. An additional 18,560 acres is water in lakes, streams, and ponds. The Red River forms the western boundary of the parish. Benton is the parish seat.

The Red River bottom lands along the western edge of the parish are generally level and productive. They are used principally for cotton, feed crops, and pasture for cattle. Cotton is the leading crop in both acreage and value. The uplands and stream terraces are largely wooded, a small part is pastured, and a smaller acreage is cultivated. About 65.4 percent of the total land area of Bossier Parish is in commercial forest.

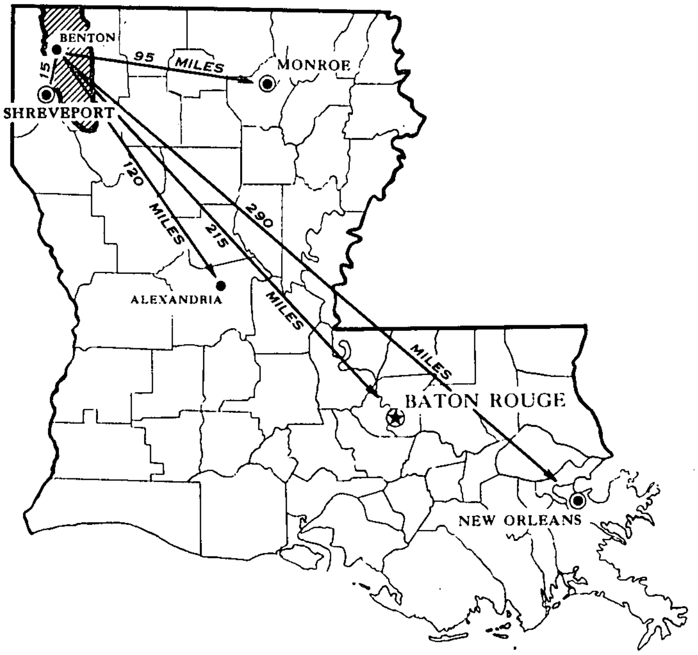

***Figure 1.*—Location of Bossier Parish in Louisiana. The State Agricultural Experiment Station is at Baton Rouge.**

Agriculture

Before 1940, agriculture on both the Coastal Plain and the Red River bottom lands was based almost entirely on cotton. In 1929, 74 percent of the cropland was planted to cotton. By 1954, this percentage had decreased to 40.

Since 1940, there has been a decided change in the agriculture of the Coastal Plain area. Opportunity for employment in industry during the period 1940 to 1946, along with rising production costs and shortage of labor, caused many small farmers to turn to full-time or part-time employment away from their farms. Farmers whose holdings were large enough converted their cropland into pasture for livestock, largely beef cattle. Some farmland was sold to other operators, and a considerable acreage of former cropland was left idle or was allowed to reseed to pine.

This trend away from row-crop farming is continuing. At present, only about 4,000 acres in the Coastal Plain area is used for cultivated crops.

Since about 1955, there has been increasing interest in tree farming. Trees in many of the fields retired from cultivation in the early 1940's are now large enough to be harvested as pulpwood. Interest in planting nursery grown pine seedlings has increased. Records show that, for the years 1955 to 1959, about 4,500 acres in the Coastal Plain area of the parish was planted to pine.

On the productive alluvial soils of the Red River Valley, agriculture has been more stable. Here, cotton is still the leading crop in both acreage and value. Mechanization and an increase in the amount of land used for production of livestock, mostly beef cattle, have been the principal changes in agriculture on these soils since 1940.

Reduction in the acreage planted to cotton has resulted in the selection of the lighter soils, such as Yahola silt loam, very fine sandy loam, and silty clay loam, for this crop. The clay types, such as Miller, Roebuck, and Buxin clays, are used largely for improved pasture, small grain, and hay.

On the alluvial soils along the Red River, the use of supplemental irrigation is increasing. It is estimated that in 1954 about 3,750 acres was irrigated at least once. Of this, about 1,300 acres was in pasture, 1,500 acres in cotton, 500 acres in corn, 350 acres in hay, and 100 acres in vegetables. The acreage irrigated varies from year to year, depending on the distribution of rainfall during the growing season.

The income from the sale of farm products in this parish during 1954 was more than $5 million. Seventy-five percent of this came from the sale of crops. Dairy products brought in 4 percent of the income, and other livestock and livestock products brought in 20 percent. The income from farm forest products was only 1 percent of the total.

Land Use and Types of Farming

In 1954 Bossier Parish had 248,987 acres of land in farms. This was 46.3 percent of the total land of the parish. Cropland, including that lying idle, covered

103,602 acres. There was 93,809 acres of woodland. Some cropland and some woodland areas were pastured, but, in addition, 44,481 acres that was neither cropland nor woodland was used for pasture. The remaining 7,095 acres of farmland was used for buildings, yards, roads, and miscellaneous needs.

The average size of farms has been steadily increasing. The average size in 1930 was 41.0 acres; in 1935, 53.6 acres; in 1940, 70.9 acres; and in 1954, 123.3 acres. In the 1954 census, 363 farms of less than 10 acres were reported; 631, from 10 to 29 acres; 354, from 30 to 49 acres; 495, from 50 to 259 acres; 77, from 260 to 499 acres; 58, from 500 to 999 acres; and 42, 1,000 acres or more.

In the 1954 census, 1,202 of the farms of the parish were not classified by type of farming. Of the remainder, 602 were cotton farms and 130 were livestock farms other than dairy or poultry. There were 32 poultry farms, 12 dairy farms, 5 vegetable farms, and 5 fruit-and-nut farms. Only 1 was a cash-grain farm, and the remaining 31 were general farms.

Farm Tenure

According to the 1954 census, about 57 percent of the farms were operated by owners; 14 percent, by part owners; 7 percent, by cash tenants; 11 percent, by croppers; 3 percent, by share tenants; and 6 percent, by other and unspecified tenants. In recent years there has been an increase in the percentage of farms operated by owners or part owners. The number of farm tenants in Bossier Parish has decreased continuously since 1930. According to census records there were 3,886 tenants of all types in 1930; in 1954 there were 572.

Before 1940 sharecropping was the prevailing system on the large farms in the Coastal Plain area, but since 1940 this system has declined. Many of the farms in this area have been converted from row-crop farms to livestock and woodland farms operated by the owner.

On the bottom lands along the Red River the number of tenants has decreased. Sharecropping, so common in the past, has almost disappeared. Most tenants now furnish only the labor, and the owner furnishes land, seed, fuel, equipment, and buildings.

The need for labor on cotton farms has decreased rapidly since the coming of mechanization and scientific improvements in control of weeds and insects.

At present the prevailing system on cotton farms in the Red River bottom lands is for the owner or part owner to operate the farm and hire labor by the day, week, or month. The owner may furnish living quarters as part of the pay, but no crop sharing is done.

Principal Crops

Cotton, corn, and hay have always been among the most important crops grown in the parish (table 1).

Since 1929 the cotton acreage has steadily declined. The acreage of hay crops and small grains, principally oats, has steadily increased. This trend has paralleled the increasing importance of cattle raising.

The decline in the acreage of corn has been partly offset by increased yields, particularly in the last few years. With mechanization and the decrease in numbers of work stock on farms, the need for corn has decreased.

TABLE 1.—*Acreage of the principal crops, in stated years*

Crop	1949	1954
	Acres	*Acres*
Cotton harvested	35, 418	26, 073
Corn, total	8, 159	7, 882
Harvested for grain	7, 909	6, 832
Cut for silage	42	266
Hogged, grazed, or cut for fodder	208	784
Oats, threshed or combined for grain	2, 087	2, 516
Soybeans, for all purposes	706	1, 661
Cowpeas, for all purposes except processing	1, 152	903
All hay	9. 132	14, 950
Alfalfa and clover [1]	7, 212	8, 493
Lespedeza	714	288
Small grains cut for hay	95	1, 478
Other hay, chiefly bermudagrass and johnsongrass	1. 111	4, 691
Fruit trees and nut trees	1, 632	2, 372

[1] Includes hay cut for dehydrating.

During the last 30 years, the acreage of cultivated crops has decreased, but yields per acre have greatly increased. These increased yields are due to better fertilization, improved varieties, better control of insects and weeds, improved cultural practices, and an increased knowledge of the basic requirements of the various crops. Drainage of wet lands and more effective control of erosion have also helped to increase yields over the years.

Livestock and Livestock Products

Livestock has always been important in the agriculture of Bossier Parish (table 2).

The earliest settlers used oxen for pulling the wagons that were their chief means of transportation. Later, the oxen were replaced by horses and mules as a source of farm power for plowing and transportation. Since the early 1930's, tractors and other machines have largely replaced horses and mules, which have steadily declined in numbers.

Both swine and cattle were brought into the parish by the early settlers. For many years they ranged freely over the countryside, as only the fields under cultivation were fenced. Later, as more of the land was settled and agricultural improvements were made, the breeding of both swine and cattle was improved and they were better cared for.

Since 1930 the number of cattle has more than tripled, but the number of swine has decreased by about one half.

TABLE 2.—*Livestock on farms, in stated years*

Livestock	1950	1954
	Number	*Number*
Cattle and calves	21, 900	38, 867
Dairy cattle	2, 814	3, 294
Horses and mules	2, 897	2, 246
Swine, all ages	11, 004	6, 557
Sheep and lambs	670	2, 781
Poultry:		
Chickens, 4 months old or older	44, 863	47, 253
Turkeys raised	[1] 1, 294	19, 605

[1] For year 1949.

The breeding and quality of both have been greatly improved. At present, there are many herds of purebred and high-quality crossbred beef cattle. Some operators producing yearling fat calves use purebred beef bulls and cows of mixed dairy and beef breeds.

Scrub hogs still range at large in a few areas, including the bottom lands of Bodcau Bayou, but they are decreasing in numbers and are now but a remnant of the thousands that ranged wooded tracts in past years. In some parts of the parish, herds of cattle range old unfenced fields and openings. With the increased interest in reforestation, range of this type is decreasing in extent yearly, and in a few years none will be left.

The total number of dairy cattle decreased between 1940 and 1954, because the decrease in the number of farms in in the Coastal Plain area brought a corresponding decrease in the number of milk cows kept to supply home needs. Commercial dairying has increased in recent years, but dairy farms are few and small, compared with the beef enterprises.

Until very recently there have been only a few sheep on farms. In the last few years their number has increased, and a number of farms now raise sheep and market both fat lambs and wool.

Wildlife

Bossier Parish has feed, water, and range for abundant wildlife. About 291,521 acres is in upland forest, generally of mixed pine and various hardwoods. About 28,584 acres is in bottom-land forest made up mostly of hardwoods and cypress. About 18,560 acres is in rivers, lakes, and ponds. Oats, corn, hay, pasture, and idle land are additional sources of food and cover.

Deer are fairly abundant in several sections of the parish, as a result of restocking and protection in recent years. The principal small game animals are gray squirrel, fox squirrel, cottontail rabbit, and swamp rabbit. The most numerous game birds are bobwhite and mourning dove. During the winter migration, there are numerous species of ducks and wild geese.

Several thousand acres near the Bodcau Reservoir is being developed as a public shooting area and is intensively managed for deer, duck, quail, and mourning dove.

Many farmers and landowners are interested in wildlife conservation. Soil and water conservation plans, developed by landowners in cooperation with the Dorcheat Soil Conservation District, provide for measures beneficial to wildlife. Particularly beneficial are the use of soils within their capabilities, fertilization of crops and pasture for high productivity, planned management and selective cutting of woodlands, and the construction, correct stocking, and management of farm ponds for fish production.

Specific references to soils particularly suited to special wildlife uses are in the sections "Descriptions of the Soils" and "Capability Groups of Soils."

Additional Facts About the Parish

Bossier Parish was established as a political subdivision on February 24, 1843. From 1828 to 1843 this territory was a part of Claiborne Parish. Before 1828 it was a part of Natchitoches, one of the original 19 parishes created by the Territorial legislature in 1807.

Before 1840 there were only a few hundred people living in the present area of the parish. The earliest permanent settlements were probably near Rocky Mount and near Bellevue. In the period 1840 to 1850, many new settlers came from Virginia, the Carolinas, Georgia, and Alabama. By 1860 cotton had become an important crop and was grown extensively both on the bottom lands of the Red River and on the well-drained uplands and terraces.

In 1850 the population was 6,962; by 1880 it had increased to 16,042; and by 1900, to 24,153. By 1900 there were 3,212 farms in the parish, totaling 278,528 acres, of which 128,000 acres was cultivated. Cotton and corn were the leading crops.

With the coming of the railroads during the period 1884 to 1898, there was a shift in the population to the newly established railroad towns, some of which, a few years later, became sawmill towns. Benton was one of these new railroad towns. It was selected as the parish seat in 1888.

Physiography and Drainage

Bossier Parish is in the upper part of the Gulf Coastal Plain. The relief is nearly level to strongly sloping, and the entire area slopes gently southward. The Red River forms the western boundary of the parish. The river flows southward in a meandering course, covering a distance of about 60 miles within the parish.

Natural drainage is generally southward. Although there are many flat, slowly drained areas, the drainage system is, in general, well developed. The major drainageways are Dorcheat, Bodcau, Red Chute, Cypress, and Loggy Bayous, all of which flow to the Red River.

There are three major topographic divisions in the parish: the alluvial valley of the Red River, the Tertiary uplands, and the broad stream terraces that are locally known as flatwoods. Each of these three divisions is described briefly in the section "General Soil Areas."

Climate

The climate of Bossier Parish is influenced principally by its subtropical latitude, the huge land mass to the north, and the proximity of the warm waters of the Gulf of Mexico. Local modifications are caused by variations in topography. In summer the prevailing southerly winds provide a moist tropical climate, but occasionally the pressure distribution is such as to bring west or north winds and hot dry weather. In winter the area is alternately subjected to moist tropical air and to dry cold air. Changes in temperature are sometimes extreme.

The relative humidity is 60 percent or more 72 percent of the time and less than 40 percent only 7 percent of the time. When the temperature is 90 degrees or higher, the relative humidity never exceeds 79 percent. There is a chance that the temperature will fall to 20 degrees or lower on one or more days in 9 out of 10 years. Temperatures of 32 degrees or lower occur on an average of 43 days a year, and temperatures of 90 degrees or higher occur on an average of 103 days a year. There is a 50-percent chance of a freeze after March 26th in the spring and before November 8th in the fall. There is a 20-percent chance of a freeze after April 4th in the spring and before October 27th in the fall. The average frost-free period is 222 days a year.

A tornado occurs about once in 6 years, and a damaging windstorm on an average of once in 3 years. A damaging hailstorm occurs on an average of once in 6 years. A measurable amount of snow falls in three winters out of four.

Bright sunshine and high temperatures are typical in summer. Most cultivated crops and hay crops are harvested during the relatively dry summer and fall months. Winters are characterized by cool, cloudy, wet weather followed by clear, cold weather. Winters are normally mild enough so that small grain and cool-season grasses and legumes continue to grow.

The annual and monthly temperatures and precipitation at Plain Dealing are given in table 3.

TABLE 3.—*Temperature and precipitation at Plain Dealing, Bossier Parish, Louisiana*

[Elevation, 291 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1936)	Wettest year (1902)	Average snowfall
	°F.	*°F.*	*°F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	48. 3	83	−1	5. 15	3. 81	5. 30	0. 6
January	46. 0	85	−3	5. 09	1. 23	4. 41	1. 0
February	50. 1	88	−14	3. 95	1. 62	2. 60	. 6
Winter	48. 1	88	−14	14. 19	6. 66	12. 31	2. 2
March	56. 4	93	13	5. 11	3. 19	5. 74	. 2
April	65. 2	95	26	5. 23	2. 39	4. 98	(3)
May	72. 2	99	35	4. 77	6. 19	7. 05	0
Spring	64. 6	99	13	15. 11	12. 49	17. 77	. 2
June	80. 0	108	45	3. 02	(3)	12. 52	0
July	82. 8	111	52	4. 46	4. 38	15. 42	0
August	83. 3	114	52	2. 39	1. 01	. 59	0
Summer	82. 0	114	45	9. 87	5. 39	28. 53	0
September	77. 9	107	38	2. 38	. 61	9. 18	0
October	67. 2	103	22	2. 65	2. 40	3. 82	(3)
November	55. 0	94	11	4. 27	2. 69	7. 30	. 1
Fall	66. 7	107	11	9. 30	5. 70	20. 30	. 1
Year	65. 4	114	−14	48. 47	30. 24	78. 91	2. 5

[1] Average temperature based on a 62-year record, through 1954; highest temperature on a 59-year record and lowest temperature on a 60-year record, through 1952.

[2] Average precipitation based on a 63-year record, through 1955; wettest and driest years based on a 62-year record, in the period 1892-1955; snowfall based on a 55-year record, through 1952.

[3] Trace.

Water Supply

Bossier Parish has an abundant supply of surface water in lakes, streams, and ponds. Lake Bistineau is the largest lake. It has a surface area of about 5,370 acres in this parish and extends into Webster Parish. The Red River is the largest stream; about 4,519 acres of it is in Bossier Parish. There are many smaller lakes and streams.

According to a recent survey (*9*),[1] the parish can be divided into three general areas on the basis of availability of ground water. These general areas are the Red River Valley, the northern part of the parish, and the southern part of the parish.

In the Red River Valley, shallow wells in sand and gravel strata of the alluvial deposits yield hard water at the rate of as much as 1,300 gallons per minute. Deep wells yield small quantities of soft water, generally 20 to 200 gallons per minute. Locally, yields of 300 to 500 gallons per minute have been obtained.

In the northern part of Bossier Parish, moderate to large quantities of soft water are available. Large-diameter wells generally yield from 200 to 1,200 gallons per minute. Deposits of Pleistocene age supply water to shallow wells. Wells range from 100 to 900 feet in depth.

In the southern part of the parish, small to moderate quantities of soft water are available. Yields range from a few gallons to a maximum of about 400 gallons per minute. Locally, Pleistocene deposits supply small amounts of water to shallow wells.

Transportation and Markets

All parts of the parish are served by both railroads and main-line highways.

The St. Louis Southwestern Railway (Cotton Belt Route) enters the parish from the north and serves the towns of Bolinger, Plain Dealing, Benton, and Bossier City. The Illinois Central Railroad crosses the parish from east to west. It goes through Bossier City and Haughton. The Louisiana and Arkansas Railway (part of the Kansas City Southern Lines) runs east and west and also south from Bossier City and passes through the towns of Princeton, Adner, Taylortown, and Elm Grove.

The principal highways are U.S. 80, U.S. 71, and La. 3. U.S. 80 traverses the parish east and west. U.S. 71 extends south from Bossier City, and La. 3 runs from Bossier City north through Benton and Plain Dealing to the Arkansas line. All three highways converge in Bossier City.

In addition to the principal highways, a number of hard-surfaced, all-weather State highways serve as farm-to-market roads. An extensive network of all-weather, iron-ore-surfaced parish roads cover nearly every section of the parish.

Six cotton gins serve the principal cotton-growing communities. Five are located on the Red River bottom lands, where most of the cotton is grown.

Most of the livestock is marketed at two large auction barns. One is located just north of Bossier City, and the other at Curtis, about 7 miles south of Bossier City. Some livestock is trucked to stockyards in Shreveport, Louisiana, or to other markets outside the parish.

Most of the milk from dairies is sold to local distributors and processors in Bossier City or Shreveport.

Vegetables are sold locally to distributors and retail outlets.

Timber products are shipped by rail or trucked to mills and treating plants within the parish or in neighboring parishes.

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[1] Italic numbers in parentheses refer to Literature Cited, page 141.

Industries

The oil and gas industry and the wood-product industry are of major importance in Bossier Parish.

The oil and gas industry covers producing, refining, and transporting of the oil and gas. There are six major oil and gas fields. The Carterville and North Carterville fields are in the northeastern corner of the parish. The Bellevue field is in the central part near the eastern boundary. The Elm Grove and Sligo fields are in the southern part, and the Benton field is near the town of Benton. The total value of petroleum products for the year 1953 was more than $22 million.

A number of concerns in Bossier Parish manufacture lumber and basic timber products. Seven sawmills are located in the parish. Three small portable mills cut railroad ties and small construction timbers, and four large mills produce kiln-dried, graded lumber. There are two plants at which poles, pilings, posts, and lumber are pressure-treated with creosote.

The only minerals being developed at present are byproducts of the oil and gas industry. The northern part of Bossier Parish is in the general area in which commercial-grade deposits of iron ore are known to occur, but these deposits have not so far been developed. Soils known as "native gravel" or "iron ore" generally have a relatively high content of gravel-size fragments of ironstone with a sandy clay binder. These soils are extensively strip mined for surfacing of secondary roads, embankments, and road shoulders.

Other important industrial enterprises are the manufacture of concrete products, the manufacture of chemicals from petroleum products, and the manufacture and distribution of oilfield equipment.

How Soils Are Named, Mapped, and Classified

Soil scientists made this survey to learn what kinds of soils are in Bossier Parish, where they are located, and how they can be used.

They went into the parish knowing that they probably would find many soils that they had already seen, and perhaps some they had not. As they traveled over the parish, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug or bored many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down to the parent material that has not been changed much by leaching or by plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in other parishes nearby and in counties more distant. They classified and named the soils according to uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important distinguishing characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first described and mapped. Gallion and Ruston, for example, are the names of two soil series. All the soils in the United States that have the same series name are essentially alike in natural characteristics.

Many soil series contain soils that differ in texture of their surface layer. According to these differences in texture, separations called soil types are made. Within a series, all the soils that have a surface layer of the same texture belong to the same soil type. Gallion silt loam and Gallion silty clay loam are two soil types in the Gallion series. The difference in the texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into soil phases. The name of a soil phase indicates a feature that affects management. For example, Gallion silt loam, 3 to 5 percent slopes, is one of several phases of Gallion silt loam, a soil type that ranges from nearly level to sloping.

After a fairly detailed guide for classifying and naming the soils had been worked out, the soil scientists drew soil boundaries on aerial photographs. They used photographs for their base map because photographs show woodlands, buildings, field borders, trees, and similar details that help greatly in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientist has a problem of delineating tracts where different kinds of soils are so intricately mixed or occupy such small individual areas that it is not practical to show them separately on the map. Therefore, he shows this mixture of soils as one mapping unit and calls it a soil complex. Ordinarily, a soil complex is named for the major soil series in it, for example, Acadia-Wrightsville complex. In this parish some areas are so covered with sandy mounds that the differences in texture and slope pattern affect management considerably. An example is Acadia complex, mounded.

Some areas mapped are so rocky, so shallow, or so frequently worked over by water that they cannot be called soils. These areas are given descriptive names, such as Mixed wet alluvial land or Riverwash, and are called land types rather than soils.

The soil survey was only partly done when the soil scientist had named and described the soil series and mapping units and had shown the location of the mapping units on the soil map. The mass of detailed information he had recorded then needed to be presented in different ways for different groups of users, among them farmers, managers of woodlands, and engineers.

To present the information efficiently, the soil scientist had to consult with persons in other fields of work and, with their help, to prepare groupings that would be of practical value to different users. An example of such a grouping is the capability classification, designed mainly for those interested in producing crops and pasture. The woodland suitability groups are for those who manage tracts of woodland. The engineering classifications are for those who build highways or structures to conserve soil and water.

General Soil Areas

There are three primary topographic divisions in Bossier Parish: the Tertiary uplands, the broad stream terraces that are locally called flatwoods, and the bottom lands of the Red River. In each of these three divisions there are several general soil areas, or soil associations. Each soil association has a distinctive pattern of soils that influences the kind of farming. The soil associations are shown on the colored map at the back of this report and are described in the following pages. Figure 2 shows the relationship of the three kinds of topography in the northwestern part of Bossier Parish.

Soils of the Uplands

The Tertiary uplands are in the north-central and northwestern parts of the parish, near Plain Dealing, and in the central part, east of Benton and near Haughton, Fillmore, Princeton, and Bellevue. The topography of the uplands is varied; there are gently sloping divides and hilly, broken, strongly dissected escarpments. The largest of the escarpments is north and northwest of Plain Dealing. The elevation ranges from about 250 to 460 feet above sea level. The geologic materials that outcrop are largely of the Claiborne group; they include the Cook Mountain, Cockfield, and other formations. Drainage is typically good to excessive.

There are three soil associations in the uplands.

1. Gently sloping to rolling uplands: Shubuta-Ruston, hard substratum, association

About 13 percent of Bossier Parish is in this association. Areas occur throughout the uplands; the largest is near Plain Dealing.

Shubuta soils and Ruston, hard substratum, soils are dominant. Together, they occupy about 85 percent of the association. Ruston, hard substratum, soils occupy about 20 percent.

The Shubuta soils have a subsoil of blocky, red sandy clay or clay. They occupy ridgetops and moderate to steep slopes. The Ruston, hard substratum, soils have a subsoil of strong-brown to yellowish-red sandy clay loam, silty clay loam, or clay loam, and a substratum that is firm when moist and hard when dry. They are on the broader, gently sloping ridges or on gentle foot slopes.

The other soils in this association are mostly members of the Savannah, Boswell, and Luverne series. The Savannah soils are similar to the Ruston, hard substratum, soils but have a yellowish-brown subsoil. The Boswell soils commonly occupy ridgetops and moderate to steep slopes. They have a red, plastic clay subsoil underlain by mottled, red and gray, plastic clay. The Luverne soils are well drained. They have a red or dark-red clay loam or sandy clay loam subsoil underlain by friable sandy loam. They occupy rather narrow ridges and moderate to steep slopes.

A minor part of this association consists of Mixed wet alluvial land on narrow stream bottoms where drainage is generally poor or somewhat poor.

Much of this association has gentle or moderate slopes (less than 8 percent), and more than half of it has been cultivated in the past. At present, only a few small fields are cultivated. They are used for cotton, corn, and crops for home use. There are a number of livestock farms, mostly near Plain Dealing, that have improved pastures of bermudagrass and crimson clover. Native pastures of carpetgrass and common lespedeza are on the small stream bottoms. Many of the fields that were formerly cultivated have been allowed to reseed to pine and sweetgum or have been planted to pine.

The gentler slopes are suited to most of the cultivated crops, but intensive erosion control measures are necessary to keep them continuously productive. Many kinds of pasture plants will grow well if properly fertilized.

The soils in this association are well suited to both loblolly pine and shortleaf pine.

A few small areas have been surface stripped to obtain ironstone gravel for use in surfacing secondary roads. These are mostly areas of gravelly Shubuta and Luverne soils.

2. Highly dissected steep slopes and narrow ridgetops: Kirvin-Shubuta-Susquehanna association

About 6 percent of the parish is in this association. The largest areas are north of Plain Dealing and near Rocky Mount. The smoother ridgetops occupied by well-drained, generally gravelly Kirvin and Nacogdoches soils are known locally as redlands. The Nacogdoches soils are of minor extent but are among the most productive upland soils for most row crops, orchard crops, and vegetables.

The gravelly Kirvin and Shubuta soils are dominant in this association; the Susquehanna and Boswell soils occupy many of the steeper slopes. The gravelly Nacogdoches and Luverne soils are important locally. The Kirvin soils occupy about 40 percent of the area, the Shubuta soils about 20 percent, and minor soils, including Mixed wet alluvial land on narrow stream bottoms, about 15 percent.

The Kirvin soils have a dark-brown surface soil and a red to dark-red, friable clay loam to sandy clay subsoil. They occur chiefly on hilltops, narrow winding ridges, and moderately steep to steep upper slopes. The gravelly type, which is 15 to 30 percent ironstone fragments and concretions, is the most extensive.

The Shubuta soils have a grayish-brown to brown surface soil and a red, firm sandy clay to clay subsoil. The gravelly phases are 15 to 30 percent ironstone fragments, most of which are near the surface.

The Susquehanna soils have a thin, grayish-brown, sandy surface soil and a subsoil of highly mottled, red and gray, plastic, sticky clay.

The Boswell soils have somewhat thinner horizons but otherwise resemble Shubuta soils in the upper layers. They are underlain by mottled, red and gray, plastic clay.

The Nacogdoches soils are similar to the Kirvin soils but are more deeply weathered, are more friable and

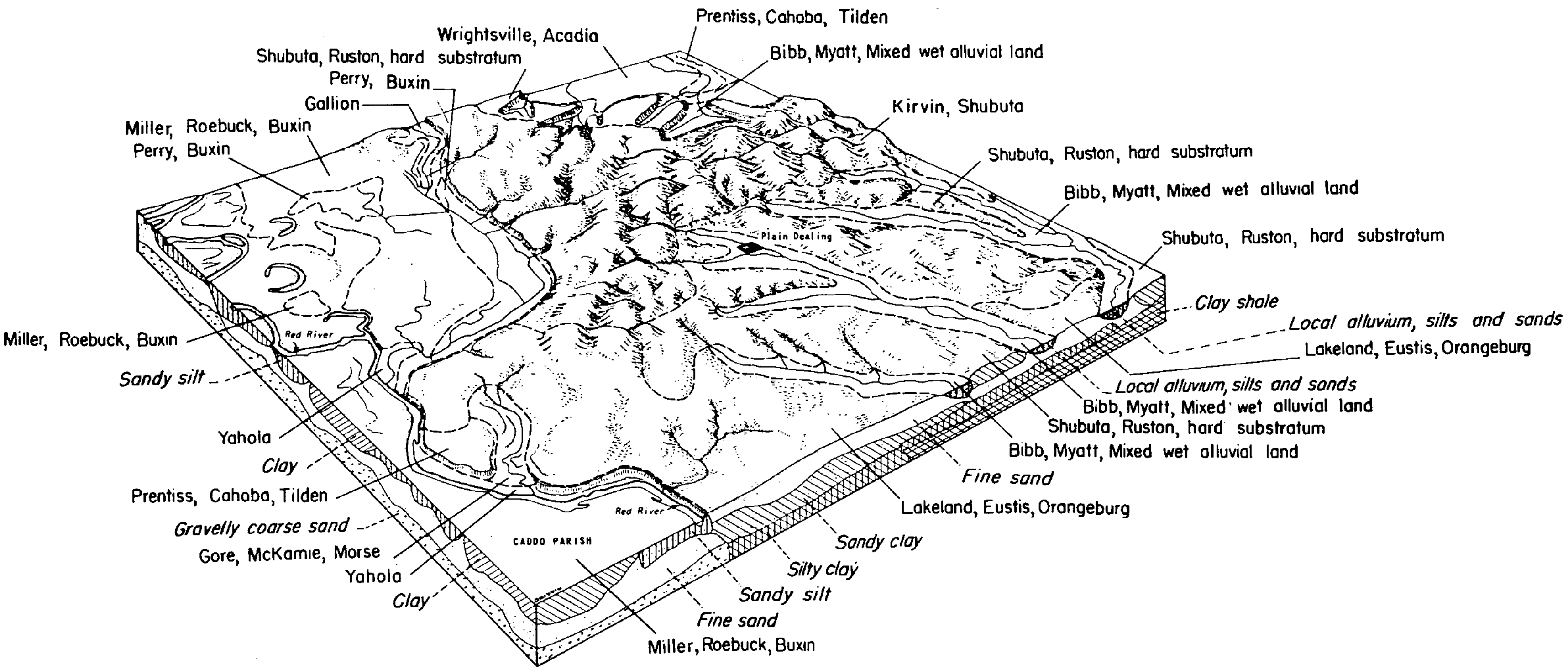
Prentiss, Cahaba, Tilden
Wrightsville, Acadia
Bibb, Myatt, Mixed wet alluvial land
Shubuta, Ruston, hard substratum
Perry, Buxin
Gallion
Kirvin, Shubuta
Miller, Roebuck, Buxin
Perry, Buxin
Shubuta, Ruston, hard substratum
Bibb, Myatt, Mixed wet alluvial land
Shubuta, Ruston, hard substratum
Plain Dealing
Clay shale
Local alluvium, silts and sands
Lakeland, Eustis, Orangeburg
Miller, Roebuck, Buxin
Red River
Sandy silt
Local alluvium, silts and sands
Bibb, Myatt, Mixed wet alluvial land
Shubuta, Ruston, hard substratum
Yahola
Bibb, Myatt, Mixed wet alluvial land
Clay
Fine sand
Prentiss, Cahaba, Tilden
Lakeland, Eustis, Orangeburg
Gravelly coarse sand
Red River
Gore, McKamie, Morse
CADDO PARISH
Sandy clay
Yahola
Silty clay
Clay
Sandy silt
Fine sand
Miller, Roebuck, Buxin

Figure 2.—**Physiographic relationships of general soil areas in the northwestern part of Bossier Parish. The area represented is about 12 miles square.**

permeable, and have a dark reddish-brown surface soil and a dark-red loam to clay loam subsoil.

Most of this association is in pine-hardwood forest. Nearly all of the smoother ridgetops and gentler slopes have been cultivated in the past. Many old fields have reverted to loblolly and shortleaf pine. It is estimated that less than 10 percent of this association is now in pasture or crops.

The farms are interspersed among large forested areas. Most of them consist of a few small fields cultivated to crops for home use. There are a few livestock farms on which the soils are used for small grain and improved pasture.

Some of the gravelly soils in this association have been rather extensively strip mined for ironstone gravel and clay. These materials are used for base course or for surfacing secondary roads.

3. Gently sloping to hilly sandy uplands: Lakeland-Eustis-Orangeburg-Vaucluse association

This association occupies about 3.6 percent of the parish. It is characterized by rather broad, rounded, gently sloping hilltops and ridges and fairly long, moderate to steep slopes toward drainageways. Near the Red River bottom lands there are highly dissected hilly areas and broad escarpments where the ridges are narrower and the slopes steeper and shorter.

The Lakeland and Eustis soils together occupy about 30 percent of the association; the Orangeburg soils, about 30 percent; the Vaucluse soils, about 20 percent; and the Luverne and Ruston soils together, about 15 percent. The remaining 5 percent is mostly Mixed wet alluvial land.

Generally the Lakeland and Eustis soils are on the higher hilltops and divides. The Orangeburg and Vaucluse soils are at the outer edges of the areas. The Luverne soils are most extensive in an area west of Plain Dealing, next to the Red River bottom lands. The Ruston soils are mostly on gently sloping ridgetops, on long, moderate slopes, or on foot slopes.

The Lakeland and Eustis soils are brownish-yellow to yellowish-red, rapidly permeable loamy fine sands. There is little textural difference to a depth of several feet. The fertility and the moisture-holding capacity are low.

The Orangeburg soils have a surface soil of grayish-brown fine sandy loam and a subsoil of dark-red, moderately permeable fine sandy loam to sandy clay loam.

The Vaucluse soils resemble the Lakeland soils in the upper horizons but are underlain by sandy clay or sandy clay loam at depths of 20 to 30 inches.

The Ruston soils are much like the Orangeburg soils in texture and in thickness of horizons but have a strong-brown to yellowish-red subsoil.

The Luverne soils resemble the Orangeburg in color but have a thicker and somewhat finer textured subsoil.

Most of this association is in forest, either native woodland of pine, oak, and hickory or nearly pure stands of young pine in old fields that were formerly cultivated. Some areas are idle, and some are unfenced and grazed by range cattle. Only a small acreage is cultivated, chiefly to crops for home use. Many of the smoother areas have been cultivated in the past, but low fertility and susceptibility to gullying, as well as a general trend away from cultivated crops all over the uplands, have contributed to changes in the use of these soils. Most of the farms are small and noncommercial. Little livestock farming is done because of the sandy texture and the accompanying low fertility and low moisture-holding capacity of most of the soils.

Soils of the Stream Terraces and Small Stream Bottoms

The broad stream terraces that are locally known as flatwoods are mostly in the eastern and southeastern parts of the parish, but in the central part they extend westward to Benton, which is at the edge of the Red River bottom lands. In the flatwoods, the topography is generally level to gently sloping, except for dissected areas along streams. Except along escarpments, the relief does not ordinarily exceed 20 feet. The elevation ranges from about 200 feet to 250 feet.

These stream terraces formed during the Pleistocene epoch. They have been correlated by geologists as the Montgomery terrace (7), an ancient flood plain of the Red River.

There are four soil associations in the flatwoods, including one that takes in the bottom lands of the small streams.

4. Nearly level to very gently sloping terraces: Wrightsville-Acadia association

This association occupies almost 23 percent of the parish. It occupies two broad areas. One is on the west side of and roughly parallel to Bodcau Bayou and extends from the Arkansas line to the Red River bottom lands southeast of Benton. The other is along the eastern boundary of Bodcau Bayou and extends southward to near Lake Bistineau.

The Wrightsville and Acadia soils are dominant. The Wrightsville soils occupy about 60 percent of the area, the Acadia soils about 20 percent, and other soils, including Stough, clay substratum phases, and Prentiss, clay substratum phases, about 15 percent. Mixed wet alluvial land in small drainageways makes up the remaining 5 percent.

The Wrightsville soils are gray, poorly drained, and strongly acid. Their surface soil ranges in texture from silt loam to silty clay. They occupy flat or slightly depressed areas and are wet for long periods during the winter and spring. They have a very slowly permeable subsoil and are generally underlain, at a depth of several feet, by a thick layer of silty clay or clay.

The Acadia soils are level to very gently sloping, somewhat poorly drained, very slowly permeable, and usually strongly acid. They are generally underlain by a thick bed of reddish, alkaline and calcareous clay stratified with sandy loam, silt loam, and silty clay loam.

The Stough soils are somewhat poorly drained and have a fragipan at a depth of about 26 to 36 inches. These soils are commonly underlain by mottled, gray, red, and brown silty clay or clay at a depth of about 36 to 44 inches.

Much of this association is characterized by low sandy to silty mounds. These mounds, when undisturbed, are generally from 18 to 24 inches in height and from 30 to 70 feet in diameter. The soil is about one textural class coarser than the surface soil between the mounds and is better drained internally. The mounds occur at random or in roughly parallel rows on either side of microdepressions or drainageways. In areas mapped as mounded soils, they cover from 15 to 30 percent of the surface.

Most of this association is in forest. Only a few small areas next to better drained soils have been cleared. The productivity is low because of wetness, high acidity, and very slow permeability. In a few places, especially near Ivan, small acreages of improved clover-grass pasture have been established by liming, fertilizing, and seeding. Most of the larger areas of this association are not in farms but are held by individuals or corporations for timber production.

5. Gently sloping higher parts of stream terraces: Prentiss-Cahaba-Tilden association

This association occupies about 6.3 percent of the parish. The slopes are generally gentle and fairly long, and variations in relief are ordinarily less than 20 feet. Gentle swells and low, winding, gently sloping ridges are characteristic.

The Prentiss soils occupy about 40 percent of the association. They are chiefly on nearly level to very gently sloping areas adjoining the flatwoods. They are moderately well drained, generally silty soils that have a yellowish-brown subsoil. There is a fragipan about 2 feet below the surface and, generally, plastic silty clay or clay at a depth of about 4 feet.

The Cahaba soils make up about 20 percent of this association. They developed in deep sandy or silty deposits near abandoned stream courses. They are well drained and moderately permeable. The subsoil is dark-brown to yellowish-red sandy loam or loam.

The Tilden soils occupy about 15 percent of the association. They are similar in color to the Cahaba soils but are generally somewhat finer textured in the subsoil and have a weak fragipan about 2 feet below the surface. They are commonly underlain at a depth of 4 feet or more by a layer of gray and red, plastic silty clay. They generally occur between the somewhat higher Cahaba soils and the lower lying Prentiss soils.

The Amite soils occupy about 10 percent of the association over all, and as much as 30 to 40 percent of some areas in the southern part of the parish. They are most extensive near Koran. These are well-drained, moderately permeable sandy soils that have a red or dark-red subsoil. They occur near escarpments and in the more dissected parts of the association and occupy the stronger, higher lying slopes.

The rest of this association consists of other soils, chiefly Mixed wet alluvial land in small stream bottoms and small areas of Wrightsville soils in depressions.

About 80 percent of this association has been cleared, but many old fields have reverted to forest. It is estimated that at present about 50 percent is open land, most of it in pasture. There are a few general farms on which cotton, corn, oats, and pasture are the principal crops. Farms range in size from a few acres, idle or used for crops for home use, to 200 acres or more, used for general or livestock farming. Row crops are grown more extensively than in any other part of the parish except the Red River bottom lands. A large proportion of this association is suitable for cultivation, and the soils are responsive to fertilization and good management. The potential productivity for pine forest is high.

6. Dissected stream terraces: Gore-McKamie-Morse association

This association lies along streams that have cut back into the terraces. It occupies about 12 percent of the parish.

The Gore soils are generally on gentle to moderate slopes near the heads of intermittent drainageways that finger into the flatwoods. They also occur, less commonly, on steep slopes further downstream on the smaller drainageways. The McKamie soils are usually on moderate to steep slopes along the larger drainageways and escarpments. The Morse soils are in places where geologic erosion is active, on escarpments along the larger streams, near the heads of actively entrenching streams, or on escarpments near the Red River bottom lands (fig. 3).

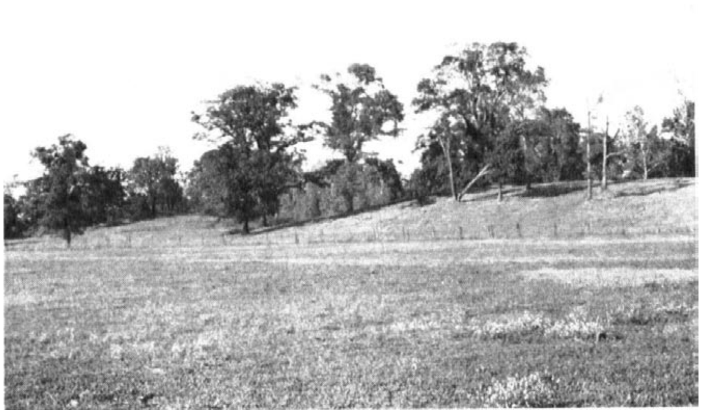

Figure 3.—**Terrace escarpment near Sligo, with Morse clay, 8 to 20 percent slopes, eroded, in background and Gallion silt loam, 0 to 1 percent slopes, in foreground.**

The Gore soils have a shallow surface soil and a mottled, plastic clay subsoil. They are underlain by red, neutral to alkaline, plastic clay, ordinarily at a depth of 50 to 54 inches. They are generally strongly acid to a depth of 3 feet or more. They occupy about 40 percent of the association.

The McKamie soils have a subsoil of red, plastic clay, generally underlain by reddish sandy loam. They are well drained and commonly strongly acid to a depth of 3 feet or more. They make up about 32 percent of this association.

The Morse soils are reddish, alkaline and calcareous, and clayey. They have weakly expressed horizons. When they are dry, wide cracks form; when they are wet, permeability is very slow. These soils occupy about 14 percent of the association.

The Hortman soils occupy about 10 percent of the association. They are moderately well drained and have very slow permeability. They are strongly acid to a depth of 3 feet or more. The lower part of the subsoil is mottled, red and gray, plastic clay.

Small, narrow areas of Mixed wet alluvial land make up about 2 percent of the association.

7. Nearly level stream bottoms and terraces: Bibb-Mixed wet alluvial land-Myatt association

This association occupies about 5.5 percent of the parish. The size of an individual area depends on the size and nature of the associated stream. The area along Bodcau Bayou is the largest; it varies from about a quarter of a mile to a mile in width and is about 30 miles long. The area along Cypress Bayou is half a mile wide or less, except near the fork of Cypress Bayou and Little Cypress Bayou, where it is about a mile and a half wide. Other areas along smaller streams are about a quarter of a mile or less in width.

This association is generally nearly level but includes some very gently sloping terraces. Local variations in relief are generally less than 10 feet.

Soils of the Bibb series occupy about 35 percent of the association; Mixed wet alluvial land, about 27 percent; and Myatt soils, about 20 percent. The remaining 18 percent is composed mainly of soils of the Chastain, Stough, and Prentiss series.

The Bibb soils are poorly drained alluvial soils derived from mostly silty or sandy stratified deposits of Coastal Plain materials. They are subject to frequent overflow.

Mixed wet alluvial land consists of very young alluvium, mostly of sandy or silty texture. It is poorly to somewhat poorly drained and is subject to frequent overflow. The profile characteristics vary widely.

The Myatt soils are gray and poorly drained. They developed in old Coastal Plain alluvium. They generally lie slightly higher than the present stream bottoms. The relief is flat or depressed and is broken by slight ridges and low mounds of Stough soils.

The Chastain soils occur on the flood plain along the lower reaches of Cypress Bayou and on the bottom lands along Bodcau Bayou to a point about 4 miles above the U.S. Corps of Engineers Dam. They are poorly drained and frequently flooded. They are mostly of clay texture.

Small areas of moderately well drained Prentiss soils on gently sloping ridges or benches are included in this association.

Nearly all of this association is in forest. Hardwoods predominate, but there is some pine on the sandier, better drained soils. Only a few small areas have been cleared, and most of these have reverted to forest. A small acreage is in pasture, and an even smaller acreage on the upper part of the west fork of Cypress Bayou near Plain Dealing is in cultivated crops. The pastures and cropland consist mostly of Mantachie, Stough, and Prentiss soils.

Little of this association is suited to cultivation. If the soils were protected from floods, intensively drained, and properly fertilized, improved pastures could be established.

Soils of the Red River Bottom Lands

The flood plain on the eastern side of the Red River extends the full length of the western edge of Bossier Parish. The width of the flood plain varies. West and southwest of Plain Dealing, where the river runs close to the upland bluffs, it is only a few feet; near U.S. Highway 80, about midway down the western border of the parish, it is nearly 7 miles.

The highest elevation on the natural levee near the Arkansas boundary is slightly more than 200 feet above sea level. The highest elevation near the southern boundary is slightly more than 140 feet. Local differences in elevation ordinarily do not exceed 10 feet and average even less.

There are five soil associations on the Red River bottom lands.

8. Nearly level to very gently sloping front lands: Yahola association

This association occupies about 5 percent of the parish. It is about 68 percent Yahola soils and about 20 percent Miller soils, chiefly Miller silt loam. The remaining 12 percent is mostly fine-textured soils of the Miller and Roebuck series.

This association is on the highest part of the Red River bottom lands. Even before protective levees were built, it was only occasionally overflowed. Only a few narrow, islandlike areas in the bends of the river are without levee protection. These are flooded or isolated occasionally during the highest floods.

The Yahola soils are reddish, mostly sandy or silty, alkaline and calcareous, young alluvial soils.

Miller silt loam is an alkaline and calcareous, young alluvial soil. It has a strong-brown to reddish silt loam surface layer, 5 to 24 inches thick, underlain by reddish-brown to dusky-red clay.

Nearly all of this association is cultivated. A few areas are used for hay or pasture. These are considered choice soils for cotton, corn, and other cultivated crops and were the first bottom-land soils to be cultivated.

Most of the farms are between 200 and 1,500 acres in size. Cotton is the main crop, but on many farms livestock is raised also, and corn, hay, and small grains are grown.

9. Nearly level stiff or buckshot soils: Miller-Roebuck-Buxin association

This association occupies about 13 percent of the parish. It consists mostly of slack-water clays. A few areas near tributaries and abandoned channels are moderately sloping.

The Miller soils, chiefly Miller clay, occupy about 40 percent of this association. These soils are generally on broad flats next to the natural levees. They are reddish-brown, slightly to moderately alkaline, moderately well drained, young alluvial soils.

The Roebuck soils are dark brown to reddish brown and are generally splotched or mottled with gray or various shades of brown. Mottling is most conspicuous below a depth of 20 inches. In the uppermost 2 feet, the reaction ranges from slightly acid to mildly alkaline. These soils occupy about 30 percent of the association. They are generally at slightly lower elevations than the Miller soils and commonly occur in depressions and partly filled abandoned channels.

The Buxin soils occur on level or slightly concave relief in old, shallow lakebeds, many of which have been drained and put into cultivation since the clearing of the Red River raft (*5*). The Buxin soils have reddish-brown, clayey upper horizons and dark-gray, gray, or mixed reddish-brown and gray lower horizons. They range from slightly acid to moderately alkaline in reaction. They occupy about 22 percent of this association.

Other soils, chiefly somewhat coarser textured members of the Miller and Buxin series, occupy about 8 percent of the association.

About 90 percent of this association is in pasture or is cultivated. A few old channel scars are in cutover cypress and bottom-land hardwoods.

Most of the farms are several hundred acres in size and are used largely for livestock production, but, as a rule, some cotton and other crops are grown. Good stands of cultivated crops are hard to obtain on these soils. The moisture-supplying capacity is poor to fair, and permeability is very slow. The plastic clay surface soil is difficult to keep in good tilth. Many acres formerly cultivated are now in pasture and hay.

10. Nearly level poorly drained to somewhat poorly drained stiff soils: Perry-Buxin association

This association occupies about 6 percent of the parish. It consists of back swamps and rim swamps, mostly near the eastern margin of the Red River bottom lands. The relief is generally flat or slightly depressed, and there are many ponded areas and remnants of the shallow lakes that were common before the destruction of the Red River raft (*5*) and the subsequent large-scale drainage of the area. About half of the association is subject to frequent flooding by Loggy Bayou, Red Chute Bayou, the Flat River, and other tributaries. When the Red River is high, normally late in winter and in spring, heavy local runoff often causes water to back up into tributary streams and flood these low areas.

The Perry soils occupy about half of the association. They are poorly drained and are dominantly gray to a depth of 40 to 44 inches. The reaction is medium acid to slightly acid in the surface soil, neutral at a depth of about 18 inches, and alkaline below a depth of 36 inches. In a few areas the surface layer is a recent deposit of reddish-brown clay about 6 to 8 inches thick.

The Buxin soils are generally at a little higher elevation than the Perry soils. They occupy about 36 percent of the association.

The other soils in the association are chiefly of the Roebuck series; these occupy about 15 percent of the area. Generally they are on broad flats and slightly wavy or undulating areas composed of a series of low ridges and narrow, winding drainageways.

About half of this association has been cleared of the native hardwood forest. Most of the cleared acreage is used for pasture. Many of the pastures are of rather poor quality, compared with pastures on other soils of the Red River bottom lands. Natural stands of whiteclover are not nearly so common as on most of the other bottom land soils. On some areas whiteclover and johnsongrass are killed by prolonged flooding.

Most of the farms are large. Raising beef cattle and growing forage crops for the cattle to graze on are the chief agricultural enterprises.

Areas not subject to damaging overflow are suitable for some crops and for improved pastures but require intensive drainage and good management. The woodland is generally of poor quality, largely because of poor management, poor cutting practices, and overgrazing. The trees are mostly of noncommercial species or cull trees of commercial species.

11. Nearly level to gently sloping silty to clayey soils on low ridges and near old channels: Gallion association

This association occupies about 3.3 percent of the parish. It is composed principally of members of the Gallion series: Gallion silt loam, Gallion silty clay loam, and Gallion clay, overwash phases. Gallion silt loam is the most extensive. It occupies about 42 percent of the association. It occurs on the higher natural levees along Red Chute Bayou, the Flat River, and other streams. This soil is moderately well drained to well drained and slightly acid to neutral. Its horizons are more strongly evident than those in any of the other soils in the Red River bottom lands.

Gallion silty clay loam generally occurs at slightly lower elevations than Gallion silt loam. Most of it is on the back slopes of natural levees. It is moderately well drained and has a dark-brown to dark grayish-brown silty clay loam surface layer and a subsurface horizon of brown to yellowish-red silt loam or silty clay loam. It makes up about 10 percent of the association.

The overwash phases of Gallion clay occupy about 33 percent of this association. They occur mostly on the back slopes of low natural levees along tributaries of the Red River. They consist of a thin, recent deposit of clayey alluvium over the older, typically medium-textured sediments that form the natural levee. The uppermost 6 to 16 inches is clayey, and the lower layers are yellowish-red silt loam, like the corresponding layers of Gallion silt loam. The reaction ranges from slightly acid to slightly alkaline.

Small acreages of Buxin, Roebuck, and Perry soils occupy about 15 percent of this association. These are generally in depressions or on flats between disconnected natural levees.

About 80 percent of this association has been cleared and is used for cultivated crops, hay, or pasture. In recent years the acreage in hay and pasture has increased, while the acreage in cotton, corn, and other cultivated crops has decreased.

Most of the farms are fairly large, and most produce both cotton and beef cattle. There are a few farms of several hundred acres that produce beef cattle only.

Most of this association is suitable for cultivation. The soils are less well supplied with plant nutrients than most of the other soils of the Red River bottom lands, but they respond to good management and are moderately to highly productive of most crops.

12. Frequently overflowed land on the flood plain: Riverwash association

This association occupies about 1.6 percent of the parish. It lies between the channel of the Red River and the higher lying natural levees (fig. 4). It is flooded frequently.

Riverwash consists of very recently deposited material, generally sandy but in places characterized by thin, stratified layers of sand, silt, and clay. The slopes are complex and uneven. Most of the area is subject to repeated deposition and scouring. A few small areas of Yahola soils, mostly Yahola very fine sandy loam, are included. These are normally at a somewhat higher elevation than Riverwash, but they are not protected by levees and are flooded or isolated during high-water stages.

Young stands of cottonwood and willow cover most of the association. A few of the higher lying areas are in pasture. Nearly all areas are used for seasonal grazing, which is probably their best use.

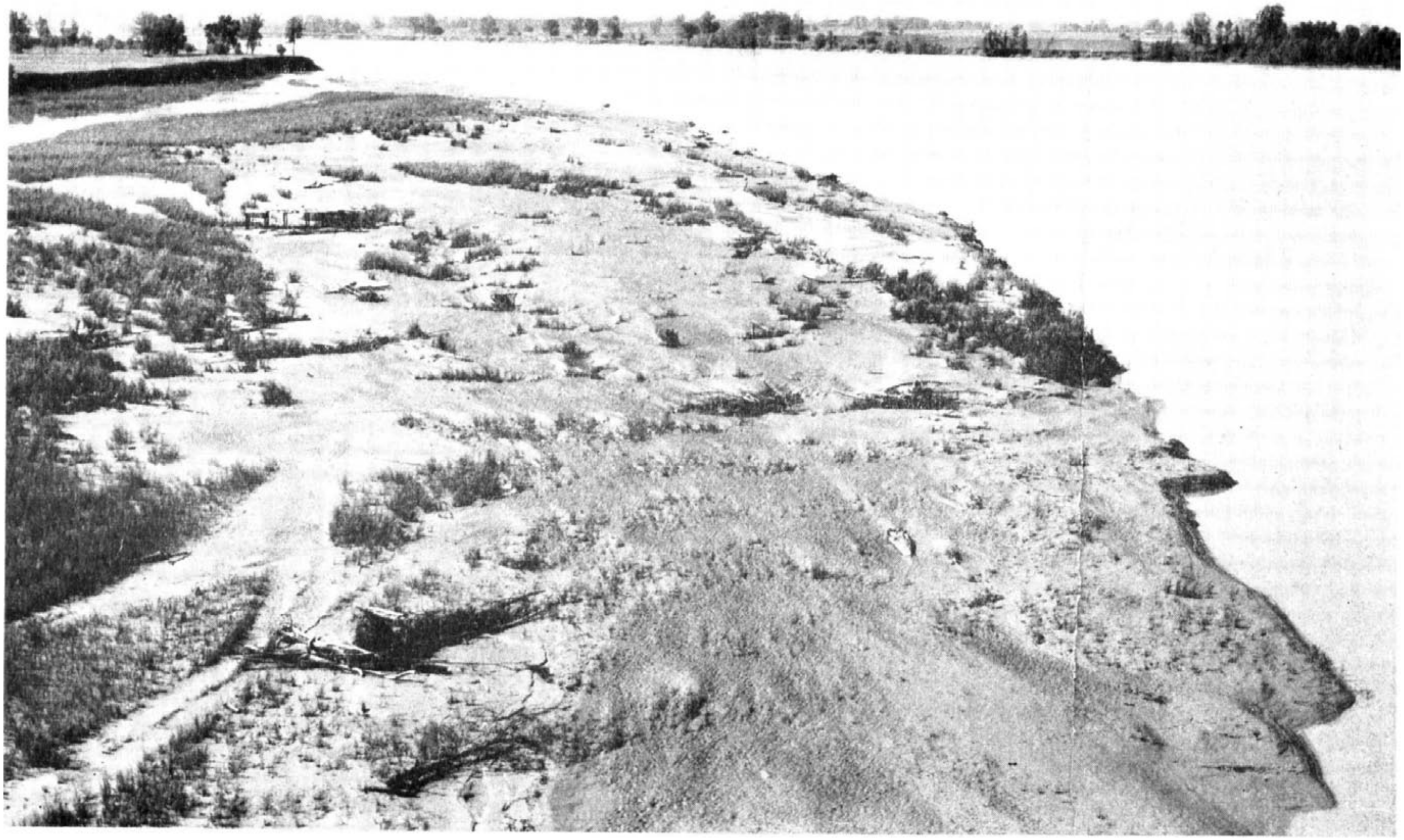

Figure 4.—**Riverwash land type with young willow trees establishing themselves on 10-month-old sandbar along the Red River.**

Descriptions of the Soils

In this section the soil series of Bossier Parish are described, and each of the soils in each series is described in detail. Soil complexes and land types are also described. The location and distribution of the soils, complexes, and land types are shown on the soil map in the back of this report. The approximate acreage and proportionate extent of each mapping unit are given in table 4.

Acadia Series

The soils of the Acadia series are somewhat poorly drained, acid, and very slowly permeable. The surface soil is silty and is dark grayish brown to grayish brown. The upper part of the subsoil is silty clay distinctly to prominently mottled with red, brownish yellow, and strong brown. The lower part is plastic clay that is generally mottled with light gray and red.

The Acadia soils formed from old alluvium that consisted mainly of sediments from red beds. They occupy nearly level to gently sloping stream terraces, locally called flatwoods.

The Acadia soils are associated chiefly with soils of the Wrightsville and Gore series. They are better drained than the Wrightsville soils. They seldom occupy depressions, as the Wrightsville soils characteristically do. The Acadia soils are generally less sloping than the Gore soils, and their subsoil is more distinct.

These are fairly extensive soils. They are used mostly for woodland. The native vegetation was chiefly upland hardwood trees and scattered loblolly and shortleaf pines.

Acadia silt loam, 0 to 1 percent slopes (Ac).—A typical profile in a moist field formerly cultivated but now in grass:

A_p 0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist, slightly hard when dry; strongly acid; abrupt, wavy boundary; 3 to 5 inches thick.

A_2 4 to 9 inches, brownish-yellow (10YR 6/6) silt loam; weak, fine, granular structure; friable when moist, hard when dry; very strongly acid; clear, smooth boundary; 3 to 7 inches thick.

B_1 9 to 11 inches, brownish-yellow (10YR 6/8) silty clay loam that has common, distinct mottles of red (2.5YR 5/8) and yellowish red (5YR 5/8); weak, fine, subangular blocky structure; friable when moist, hard when dry; extremely acid; clear, slightly wavy boundary; 2 to 5 inches thick.

B_2 11 to 21 inches, brownish-yellow (10YR 6/6) silty clay that has many, medium, prominent mottles of red (10R 5/8) and strong brown (7.5YR 5/6); moderate, medium, angular blocky structure; numerous clay films, mostly on vertical ped faces; firm to very firm when moist, very hard when dry; extremely acid; abrupt, wavy boundary; 9 to 11 inches thick.

B_{3g} 21 to 24 inches, light-gray (2.5Y 7/2) silty clay or clay mottled with about 30 percent red (10R4/8); moderate, fine, subangular blocky structure; very firm when moist, very hard when dry, plastic when wet; extremely acid; abrupt, wavy boundary; 3 to 8 inches thick.

C_g 24 to 42 inches +, light olive-gray (5Y 6/2) clay that has many, small, prominent mottles of red (10R 4/8); weak, coarse, prismatic structure that breaks down to weak, coarse, irregular blocky; very plastic when wet; extremely acid.

The depth to the C horizon generally ranges from 15 to 30 inches. In many places there is no B_1 horizon. Reddish, mildly alkaline to moderately alkaline material lies at a depth of 60 to 100 inches.

Small areas of Acadia silty clay loam and Wrightsville silt loam are included in this mapping unit.

This soil is wet, cold, and late. Its natural fertility level is low. The available moisture holding capacity is moderately low.

This soil is only fairly well suited to the common cultivated crops. It is probably best suited to hay, pasture, or woodland. (Capability unit IIIw-4; woodland suitability group 7.)

TABLE 4.—*Approximate acreage and proportionate extent of the soils*

Map symbol	Mapping unit	Area	Extent
		Acres	*Percent*
Aa	Acadia complex, mounded, 0 to 3 percent slopes	1, 129	0. 2
Ac	Acadia silt loam, 0 to 1 percent slopes	4, 772	. 9
Ad	Acadia silt loam, 1 to 3 percent slopes	1, 543	. 3
Ae	Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes	18, 879	3. 5
Af	Amite fine sandy loam, 1 to 5 percent slopes	1, 895	. 3
Ag	Amite fine sandy loam, 1 to 5 percent slopes, eroded	881	. 2
Ah	Amite fine sandy loam, 5 to 8 percent slopes, eroded	1, 126	. 2
Ak	Amite fine sandy loam, 8 to 20 percent slopes, eroded	2, 225	. 4
Am	Amite fine sandy loam, thick surface, 1 to 5 percent slopes	458	. 1
An	Amite soils, 5 to 20 percent slopes, severely eroded	1, 036	. 2
Bb	Bibb silt loam	13, 158	2. 4
Bc	Bibb, Myatt, and Stough silt loams, overflow	3, 724	. 7
Bd	Boswell fine sandy loam, 1 to 5 percent slopes, eroded	1, 753	. 3
Be	Boswell fine sandy loam, 5 to 8 percent slopes, eroded	2, 600	. 5
Bf	Boswell fine sandy loam, 8 to 20 percent slopes, eroded	1, 625	. 3
Bg	Boswell sandy clay, 5 to 8 percent slopes, severely eroded	567	. 1
Bh	Buxin clay, 0 to 1 percent slopes	14, 668	2. 7
Bk	Buxin clay, 1 to 3 percent slopes	565	. 1
Bm	Buxin clay, undulating	2, 662	. 5
Bn	Buxin complex, 0 to 3 percent slopes	1, 438	. 3
Bo	Buxin complex, overflow, 0 to 3 percent slopes	5, 071	. 9
Bu	Buxin silty clay loam, 0 to 1 percent slopes	1, 569	. 3
Ca	Cahaba fine sandy loam, 1 to 5 percent slopes	3, 427	. 6
Cb	Cahaba fine sandy loam, 1 to 5 percent slopes, eroded	767	. 1
Cc	Cahaba fine sandy loam, 5 to 8 percent slopes, eroded	566	. 1
Cd	Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded	256	(1)
Cf	Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes	1, 735	. 3
Ct	Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes	1, 599	. 3
Cy	Chastain clay	6, 787	1. 3
Ga	Gallion clay, overwash, 0 to 1 percent slopes	5, 566	1. 0
Gb	Gallion clay, overwash, 1 to 3 percent slopes	893	. 2
Gc	Gallion clay, overwash, undulating	463	. 1
Gd	Gallion silt loam, 0 to 1 percent slopes	5, 477	1. 0
Gg	Gallion silt loam, 1 to 3 percent slopes	1, 581	. 3
Gh	Gallion silt loam, 3 to 5 percent slopes	397	. 1
Gk	Gallion silty clay loam, 0 to 1 percent slopes	2, 407	0. 4
Gm	Gallion soils, mounded, 0 to 1 percent slopes	1, 376	. 3
Go	Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded	13, 546	2. 5
Gr	Gore very fine sandy loam, 1 to 5 percent slopes	3, 603	. 7
Gs	Gore very fine sandy loam, 1 to 5 percent slopes, eroded	10, 462	1. 9
Gv	Gore very fine sandy loam, 5 to 16 percent slopes, eroded	2, 390	. 4
Ha	Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes	451	. 1
Hn	Hortman very fine sandy loam, 1 to 5 percent slopes, eroded	3, 262	. 6
Hr	Hortman very fine sandy loam, 5 to 8 percent slopes, eroded	1, 565	. 3
Hs	Huckabee loamy fine sand, 1 to 5 percent slopes	372	. 1
Hu	Huckabee loamy fine sand, 5 to 20 percent slopes	588	. 1
In	Independence loamy fine sand, 0 to 1 percent slopes	313	. 1
Ka	Kalmia very fine sandy loam, 0 to 1 percent slopes	330	. 1
Kr	Kirvin fine sandy loam, 1 to 5 percent slopes, eroded	2, 932	. 5
Ks	Kirvin fine sandy loam, 5 to 8 percent slopes, eroded	2, 017	. 4
Kt	Kirvin fine sandy loam, 8 to 30 percent slopes	2, 249	. 4
Ku	Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded	349	. 1
Kv	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes	191	(1)
Kw	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded	2, 111	. 4
Kx	Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded	858	. 2
Ky	Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded	3, 021	. 6
La	Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes	629	. 1
Lb	Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes	689	. 1
Lc	Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes	1, 608	. 3
Ld	Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded	251	(1)
Lf	Luverne fine sandy loam, 1 to 5 percent slopes, eroded	2, 020	. 4
Lg	Luverne fine sandy loam, 5 to 8 percent slopes, eroded	1, 146	. 2
Lh	Luverne fine sandy loam, 8 to 20 percent slopes, eroded	962	. 2
Lk	Luverne gravelly fine sandy loam, 1 to 5 percent slopes	652	. 1

See footnotes at end of table.

TABLE 4.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Mapping unit	Area	Extent
		Acres	*Percent*
Lm	Luverne gravelly fine sandy loam, 5 to 8 percent slopes	817	0.1
Ln	Luverne loamy fine sand, thick surface, 1 to 5 percent slopes	468	.1
Lo	Luverne loamy fine sand, thick surface, 5 to 8 percent slopes	654	.1
Lp	Luverne soils, 1 to 20 percent slopes, severely eroded	397	.1
Ma	Mantachie very fine sandy loam	3,629	.7
Mb	McKamie very fine sandy loam, 1 to 5 percent slopes	456	.1
Mc	McKamie very fine sandy loam, 1 to 5 percent slopes, eroded	1,544	.3
Md	McKamie very fine sandy loam, 5 to 8 percent slopes, eroded	4,792	.9
Me	McKamie and Hortman soils, 8 to 20 percent slopes	3,374	.6
Mg	Miller clay, 0 to 1 percent slopes	18,772	3.5
Mh	Miller clay, 1 to 3 percent slopes	2,201	.4
Mk	Miller clay, 3 to 8 percent slopes	377	.1
Mm	Miller clay, overflow, 0 to 1 percent slopes	1,625	.3
Mn	Miller clay, undulating	1,367	.6
Mo	Miller silt loam, 0 to 1 percent slopes	3,077	.3
Mp	Miller silt loam, 1 to 3 percent slopes	576	.1
Mr	Miller silty clay loam, 0 to 1 percent slopes	1,371	.3
Ms	Mixed alluvial land	2,332	.4
Mt	Mixed wet alluvial land	13,421	2.5
Mu	Morse clay, 1 to 5 percent slopes, eroded	1,418	.3
Mv	Morse clay, 5 to 8 percent slopes, eroded	1,463	.3
Mw	Morse clay, 8 to 20 percent slopes, eroded	819	.1
Mx	Morse clay, 3 to 8 percent slopes, severely eroded	2,267	.4
My	Morse clay, dark surface, 1 to 5 percent slopes	272	(1)
Mz	Morse clay, dark surface, 1 to 5 percent slopes, eroded	933	.2
Maa	Muskogee complex, mounded, 1 to 3 percent slopes	339	.1
Mab	Muskogee silt loam, 1 to 5 percent slopes	3,105	.6
Mac	Muskogee silt loam, 1 to 5 percent slopes, eroded	1,895	.3
Mad	Muskogee soils, 1 to 8 percent slopes, severely eroded	213	(1)
Mae	Myatt complex, mounded	538	.1
Maf	Myatt silt loam	1,081	.2
Mag	Myatt-Stough complex, overflow	7,806	1.4
Na	Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded	555	.1
Nc	Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded	645	.1
Ng	Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded	604	.1
Ns	Nacogdoches soils, 5 to 30 percent slopes, severely eroded	234	(1)
Oc	Ochlockonee and Iuka sandy loams	991	.2
Of	Orangeburg fine sandy loam, 1 to 5 percent slopes	439	.1
Og	Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded	930	.2
Om	Orangeburg fine sandy loam, 5 to 8 percent slopes	354	.1
Or	Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded	1,145	.2
Ou	Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded	1,327	.2
Pa	Perry clay	3,847	.7
Pb	Perry clay, overflow	4,781	.9
Pe	Perry soils, overflow	428	.1
Ph	Pheba complex, mounded, 0 to 3 percent slopes	1,113	0.2
Pk	Pheba very fine sandy loam, 0 to 3 percent slopes	1,400	.3
Pm	Prentiss complex, mounded, 0 to 1 percent slopes	481	.1
Pn	Prentiss complex, mounded, 1 to 5 percent slopes	8,956	1.7
Po	Prentiss very fine sandy loam, 0 to 1 percent slopes	474	.1
Pp	Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes	623	.1
Pr	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes	2,862	.5
Ps	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded	1,474	.3
Pt	Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes	2,300	.4
Pv	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes	2,078	.4
Pw	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded	320	.1
Ra	Riverwash	9,810	1.8
Rb	Roebuck clay, 0 to 1 percent slopes	14,934	2.8
Rc	Roebuck clay, 1 to 3 percent slopes	1,269	.2
Rd	Roebuck clay, overflow, 0 to 1 percent slopes	3,089	.6
Re	Roebuck clay, undulating	2,192	.4
Rf	Roebuck silt loam, 0 to 1 percent slopes	1,036	.2
Rg	Ruston fine sandy loam, 1 to 5 percent slopes	1,830	.3
Rh	Ruston fine sandy loam, 1 to 5 percent slopes, eroded	664	.1
Rk	Ruston fine sandy loam, 5 to 8 percent slopes	320	.1
Rm	Ruston fine sandy loam, 5 to 8 percent slopes, eroded	355	.1
Rn	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes	3,838	.7
Ro	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded	5,826	1.1
Rs	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes	393	.1
Rt	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes, eroded	924	.2
Ru	Ruston soils, 1 to 8 percent slopes, severely eroded	326	.1
Sa	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes	4,809	.9
Sb	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded	2,841	.5
Sc	Sawyer fine sandy loam, 1 to 5 percent slopes	1,122	.2
Sd	Sawyer fine sandy loam, 1 to 5 percent slopes, eroded	3,271	.6
Se	Shubuta fine sandy loam, 1 to 5 percent slopes	2,679	.5
Sf	Shubuta fine sandy loam, 1 to 5 percent slopes, eroded	8,165	1.5
Sg	Shubuta fine sandy loam, 5 to 8 percent slopes	1,687	.3
Sh	Shubuta fine sandy loam, 5 to 8 percent slopes, eroded	6,115	1.1
Sk	Shubuta fine sandy loam, 8 to 16 percent slopes, eroded	1,926	.4
Sm	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes	1,798	.3
Sn	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded	6,728	1.2
So	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes	1,967	.4

See footnotes at end of table.

TABLE 4.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Mapping unit	Area	Extent
		Acres	*Percent*
Sp	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded	7, 421	1. 4
Sr	Shubuta gravelly fine sandy loam, 8 to 20 percent slopes	3, 495	. 6
Ss	Shubuta soils, 5 to 30 percent slopes, severely eroded	5, 033	. 9
St	Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded	1, 457	. 3
Su	Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes	1, 181	. 2
Sv	Stough complex, mounded, 0 to 1 percent slopes	2, 025	. 4
Sw	Stough silt loam, 0 to 3 percent slopes	2, 725	. 5
Sx	Stough silt loam, clay substratum, 0 to 1 percent slopes	3, 448	. 6
Sy	Stough silt loam, clay substratum, 1 to 3 percent slopes	456	. 1
Sz	Susquehanna fine sandy loam, 1 to 8 percent slopes	480	. 1
Saa	Susquehanna soils, 8 to 30 percent slopes, eroded	4, 280	. 8
Sab	Susquehanna soils, 5 to 30 percent slopes, severely eroded	585	. 1
Td	Tilden soils, 1 to 8 percent slopes, severely eroded	449	. 1
Tf	Tilden very fine sandy loam, 0 to 1 percent slopes	177	(1)
Ts	Tilden very fine sandy loam, 1 to 5 percent slopes	4, 097	. 8
Tv	Tilden very fine sandy loam, 1 to 5 percent slopes, eroded	3, 452	. 6
Va	Vaucluse loamy fine sand, 1 to 5 percent slopes	533	. 1
Vc	Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded	1, 453	. 3
Vf	Vaucluse loamy fine sand, 5 to 8 percent slopes	549	0. 1
Vm	Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded	839	. 2
Vs	Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded	566	. 1
Wr	Wrightsville complex, mounded	15, 998	3. 0
Wt	Wrightsville silt loam	57, 441	10. 7
Wv	Wrightsville silty clay	3, 856	. 7
Ya	Yahola clay, overwash, 0 to 1 percent slopes	2, 531	. 5
Yc	Yahola clay, overwash, 1 to 3 percent slopes	394	. 1
Yh	Yahola silt loam, 0 to 1 percent slopes	8, 248	1. 5
Ym	Yahola silt loam, 1 to 3 percent slopes	2, 020	. 4
Yn	Yahola silty clay loam, 0 to 1 percent slopes	3, 447	. 6
Yo	Yahola silty clay loam, 1 to 3 percent slopes	357	. 1
Yp	Yahola soils, overflow, 0 to 3 percent slopes	2, 257	. 4
Yr	Yahola very fine sandy loam, 0 to 1 percent slopes	3, 258	. 6
Ys	Yahola very fine sandy loam, 1 to 3 percent slopes	791	. 1
Yt	Yahola very fine sandy loam, 3 to 8 percent slopes	336	. 1
Yv	Yahola very fine sandy loam, undulating	2, 505	. 5
	Water areas less than 40 acres in size	1, 978	. 4
	Unmapped lands [2]	1, 240	. 2
	Total area of parish	538, 240	100. 0

[1] Less than 0.1 percent.

[2] Bossier city, military reservation, and gravel pits.

Acadia complex, mounded, 0 to 3 percent slopes (Aa).—About 15 percent of this mapping unit consists of mounds that have A_1 and A_2 horizons of very fine sandy loam. The soil between the mounds is typical Acadia silt loam, 0 to 1 percent slopes.

The mounds in this complex are circular to oblong in shape, 30 to 70 feet in diameter, and 18 to 36 inches in height (fig. 5). The A_1 and A_2 horizons of very fine sandy loam are 12 to 24 inches thick. Slopes of 1½ to 3 percent are common on the sides of the mounds, but the areas between the mounds are essentially level. The mounds are better drained than the areas between them because they tend to block the natural surface drainage of the lower areas in many places.

A typical profile of a mound in an area that has never been cultivated, taken while the soil was moist:

A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; moderate, medium, granular structure; very friable; strongly acid; clear, smooth boundary; 1½ to 3 inches thick.

A_2 2 to 18 inches, brownish-yellow (10YR 6/6) very fine sandy loam; weak, fine, granular structure; very friable; a few small, soft, brown concretions; very strongly acid; gradual, irregular boundary; 12 to 24 inches thick.

B_1 18 to 30 inches, brownish-yellow (10YR 6/6) sandy clay loam faintly mottled with light brownish gray (10YR 6/2); weak, medium, subangular blocky structure; friable; very strongly acid; clear, wavy boundary; 10 to 18 inches thick.

B_2 30 to 45 inches, variegated brownish-yellow (10YR 6/6), brown (7.5YR 5/4), light-gray (10YR 6/1), and red (2.5YR 4/6) silty clay; the red and gray mottling increases with depth; moderate, medium, angular blocky structure; slightly plastic and sticky; very strongly acid.

Most of this mapping unit is in woodland. Probably its best use is woodland or pasture. (Capability unit IIIw–4; woodland suitability group 7.)

Acadia silt loam, 1 to 3 percent slopes (Ad).—This soil has better natural surface drainage than Acadia silt loam, 0 to 1 percent slopes. The erosion hazard is moderate. Internal drainage is very slow.

This is not a very extensive soil. Most of it is in woodland. It is probably better suited to pasture or woodland than to the common cultivated crops. It is probably somewhat better suited to cultivated crops than Acadia silt loam, 0 to 1 percent slopes, because of its better surface drainage. (Capability unit IIIe–5; woodland suitability group 7.)

Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes (Ae).—This is a complex of soils that have distinctly different profiles but occur in an intricate pattern in individual areas too small to be separated on the map.

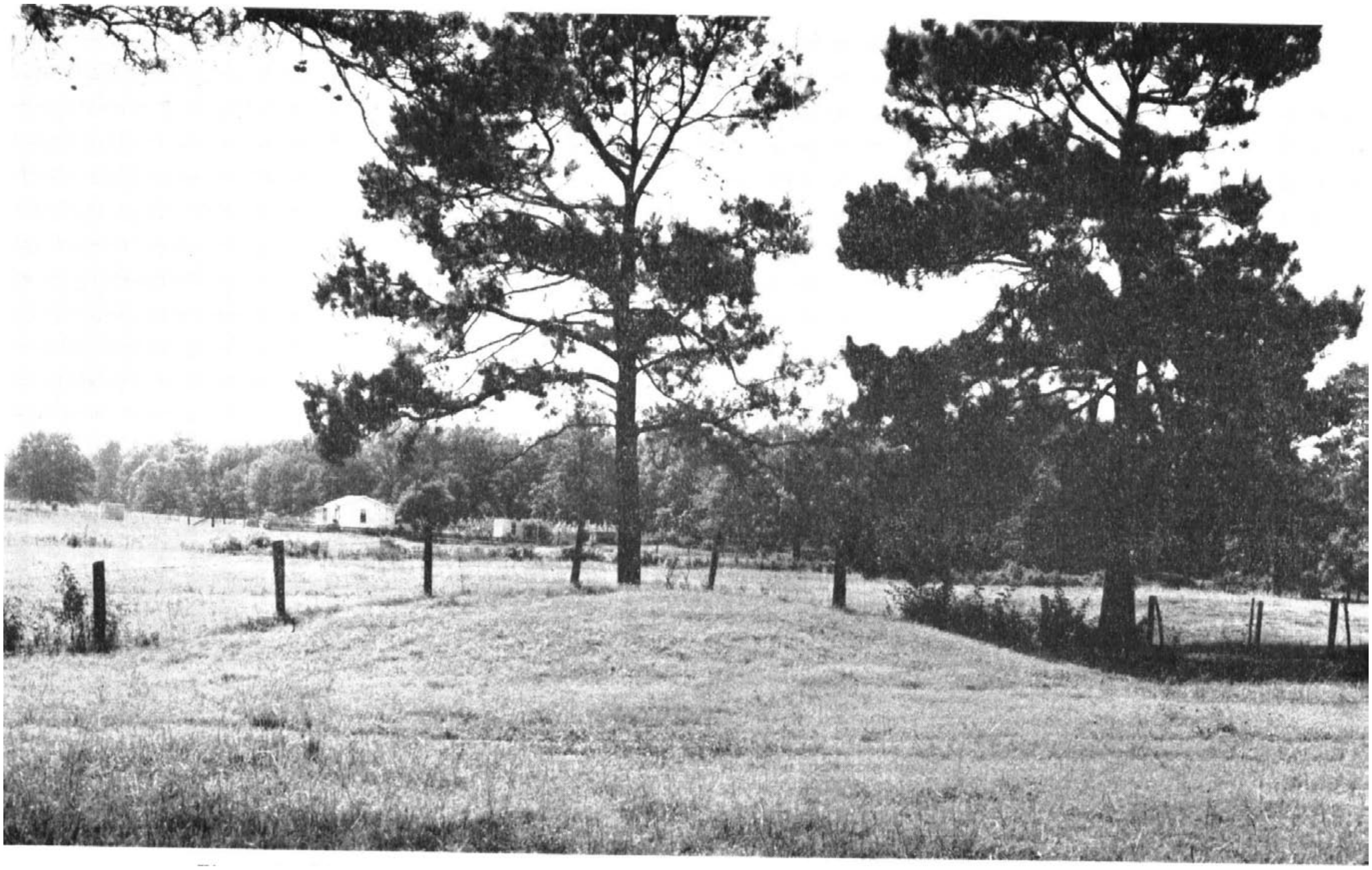

Figure 5.—**Typical mound, 50 feet in diameter and 30 inches high, on Acadia complex, mounded.**

About 50 percent of the area consists of Acadia silt loam, about 30 percent is Wrightsville silt loam, and about 20 percent is occupied by mounds.

The mounds in this complex are similar to those described under Acadia complex, mounded, 0 to 3 percent slopes. A typical profile of the Acadia soil is described under Acadia silt loam, 0 to 1 percent slopes, and a typical profile of the Wrightsville soil is described under Wrightsville silt loam. The Acadia soil occupies low ridges, and the Wrightsville soil is in slightly depressed areas. There are mounds both on the ridges and in the depressions.

This is an extensive mapping unit. Most of it is in woodland, which is probably its best use. (Capability unit IIIw-4; woodland suitability group 7.)

Amite Series

The soils of the Amite series are well drained, acid, and moderately permeable. The brown to dark grayish-brown sandy surface layer is underlain by a red to dark-red subsoil of sandy clay, clay loam, or sandy clay loam. The subsoil normally is coarser textured with depth.

These soils formed from old alluvium that consisted mostly of sediments from red beds. They are nearly level to strongly sloping and lie mainly on the higher parts of stream terraces.

The Amite soils are associated mainly with the Cahaba and Tilden soils, but in a few places they are next to McKamie and Huckabee soils. The Amite soils have a redder and more distinct subsoil than the Cahaba soils. They are redder and better drained than the Tilden soils, and they lack the fragipan typical of the Tilden soils. They are redder and finer textured than the Huckabee soils. The subsoil of the Amite soils is coarser textured and more permeable than that of the McKamie soils.

These are fairly extensive soils, but most of the individual areas are small. The native vegetation was loblolly pine, shortleaf pine, and upland hardwoods. At present, about one-half of the acreage is in young stands of pine on abandoned fields, 10 percent is cultivated, 30 percent is used for pasture, and 10 percent is idle. The soils have low natural fertility, but they are well suited or fairly well suited to most crops common to the area, except where they are seriously eroded or strongly sloping.

Amite fine sandy loam, 1 to 5 percent slopes (Af).—A typical profile in a moist, cultivated field:

A_p 0 to 10 inches, brown (10YR 5/3) fine sandy loam; weak, medium, crumb structure; very friable; slightly acid; clear, smooth boundary; 6 to 12 inches thick.

A_3 10 to 14 inches, yellowish-red (5YR 4/8) fine sandy loam; weak, medium, crumb structure; very friable; medium acid; abrupt, wavy boundary; 2 to 5 inches thick.

B_{21} 14 to 28 inches, dark-red (2.5YR 3/6) sandy clay or clay loam; moderate, medium, subangular blocky structure; clay films common and almost complete on vertical ped faces, thin and patchy on horizontal faces; firm when moist, slightly plastic when wet, slightly hard when dry; a few clay flows in old root channels; medium acid; clear, smooth boundary; 12 to 16 inches thick.

B_{22} 28 to 38 inches, dark-red (2.5YR 3/6) sandy clay loam; weak, medium, subangular blocky structure; firm in place, friable when crushed; a few clay films, mostly on vertical faces; very strongly acid; gradual, smooth boundary; 8 to 12 inches thick.

B_3 38 to 60 inches, dark-red (2.5YR 3/8) fine sandy loam; weak, coarse, subangular blocky structure; friable; very strongly acid; diffuse, wavy boundary; 18 to 26 inches thick.

C 60 to 70 inches +, red (2.5YR 4/8) sandy loam that contains pockets of yellowish-red (5YR 5/8) loamy sand; massive; very friable; very strongly acid.

In a few areas the A horizon consists of very fine sandy loam. The B horizon may be red or dark red. The combined thickness of the B_{21} and B_{22} horizons ranges from about 12 to 28 inches. A few small areas of Cahaba fine sandy loam and of Amite fine sandy loam, eroded, are included in this unit.

This soil is moderately productive if it is properly fertilized and if erosion is controlled. It is suited to most crops and pasture plants. It is also suited to pine trees. (Capability unit IIe-3; woodland suitability group 2.)

Amite fine sandy loam, 1 to 5 percent slopes, eroded (Ag).—This soil is similar to Amite fine sandy loam, 1 to 5 percent slopes, except that the surface layer averages only about 5 inches in thickness. In some spots, the A_3 horizon has been mixed into the upper layers by plowing, and the surface has a reddish-brown color.

The uses of this soil and the plants suitable for it are about the same as those for Amite fine sandy loam, 1 to 5 percent slopes. Under ordinary management, yields are usually less. (Capability unit IIe-3; woodland suitability group 2.)

Amite fine sandy loam, 5 to 8 percent slopes, eroded (Ah).—This soil has a profile like that of Amite fine sandy loam, 1 to 5 percent slopes, except that the surface layer is only 4 to 5 inches thick. In some areas the A_3 horizon or the upper part of the B horizon has been mixed into the plow layer; in these areas the color is generally reddish brown and the texture ranges from sandy loam to loam. A few shallow gullies have cut into the B horizon.

Most of the acreage is in young pine forest or in pasture or is idle. Only a few small areas are cultivated. Row crops are not so well suited to this soil as they are to Amite fine sandy loam, 1 to 5 percent slopes. Measures for control of erosion must be more intensive, and terraces are more difficult to maintain. (Capability unit IIIe-4; woodland suitability group 2.)

Amite fine sandy loam, 8 to 20 percent slopes, eroded (Ak).—The profile of this soil is similar to that of Amite fine sandy loam, 1 to 5 percent slopes, but the surface layer is generally only 4 to 5 inches thick. A few gullies have penetrated into the B horizon.

Cultivated crops are not suited to this soil because of the severe erosion hazard. Some pasture plants are fairly well suited. Pines are well suited. (Capability unit VIe-1; woodland suitability group 2.)

Amite fine sandy loam, thick surface, 1 to 5 percent slopes (Am).—This soil has a thicker surface layer than Amite fine sandy loam, 1 to 5 percent slopes. The surface layer generally ranges in thickness from 20 to 30 inches and averages about 24 inches. The available moisture holding capacity is moderately low.

Under common management, yields of most crops are about the same as on Amite fine sandy loam, 1 to 5 percent slopes, but yields of hay are not quite so high. Terraces are somewhat more difficult to maintain. Otherwise, the use and suitability of the two soils are much the same. (Capability unit IIe-3; woodland suitability group 2.)

Amite soils, 5 to 20 percent slopes, severely eroded (An).—The principal differences between this mapping unit and Amite fine sandy loam, 1 to 5 percent slopes, are that these areas have stronger slopes, a more uneven surface, and more variation in texture of the surface layer. Most areas have many spots where the B horizon is exposed or has been mixed with part of the original A horizon. There are many shallow gullies and a few deep gullies that have cut through the B horizon.

These soils are not suitable for cultivation. They are poorly suited to improved pasture. Pine woodland is probably the best use for most areas. (Capability unit VIIe-1; woodland suitability group 2.)

Bibb Series

The soils of the Bibb series are wet, poorly drained, and acid. Most of them are flooded frequently. The gray silty surface layer is underlain by stratified, predominantly gray silt loam and silty clay loam.

These soils formed from alluvium that washed chiefly from soils of the Coastal Plain. In most places the recent alluvium is a deposit 2 to 4 feet thick over older, more weathered deposits that date from Pleistocene times. The Bibb soils occupy depressions and back swamps on the flood plains of most of the larger streams, including Clarke Bayou, Cypress Bayou, and Bodcau Bayou.

The Bibb soils are associated chiefly with the Mantachie, Iuka, Ochlockonee, and Myatt soils and with Mixed wet alluvial land. They are more poorly drained than the Mantachie soils and less well drained and more gray than the Ochlockonee and Iuka soils. The Bibb and Myatt soils are similar in color and texture, but the Bibb soils lie on flood plains and have less distinct subsoil layers. The Myatt soils are on stream terraces where floods are not frequent, and their subsoil layers are more distinct. The Bibb soils have a siltier and more uniform profile than Mixed wet alluvial land, and they generally lie along larger streams.

The native vegetation on the Bibb soils is mostly water-tolerant oak, gum, and a little cypress. Pine is uncommon, except on included areas of better drained soils. Nearly all of the acreage is in woodland. The Bibb soils are extensive and widely distributed on the uplands and stream terraces.

Bibb silt loam (Bb).—The slope range of this soil is 0 to 1 percent. A typical profile on a moist willow oak flat:

A_{00} 1 to ½ inch, undecomposed oak leaves.

A_0 ½ inch to 0, dark-gray, partly decomposed oak leaves.

A_1 0 to ½ inch, dark-gray (10YR 4/1) silt loam; moderate, medium, granular structure; friable when moist, slightly sticky when wet; abundant fine roots; strongly acid; clear, smooth boundary; ½ to 1 inch thick.

A_{1g} ½ to 6 inches, gray (10YR 6/1) silt loam; a few pockets and spots of dark gray (10YR 4/1); weak, medium, granular structure; friable when moist, slightly sticky when wet; abundant fine roots; very strongly acid; clear, smooth boundary; 4 to 7 inches thick.

C_{1g} 6 to 16 inches, gray (10YR 6/1) silt loam; small, common, faint mottles of light brownish yellow (10YR 6/4); massive; friable when moist, slightly hard when dry;

fine and medium roots common; extremely acid; abrupt, smooth boundary; 8 to 12 inches thick.

C_{2g} 16 to 21 inches, gray (10YR 5/1) silt loam; common, distinct mottles of yellowish brown (10YR 5/4 to 10YR 5/6); massive; brittle and slightly hard when dry; a few roots; numerous soft, dark-brown concretions that have a black interior; very strongly acid; clear, smooth boundary; 4 to 6 inches thick.

B_{bg} 21 to 39 inches, pale-brown (10YR 6/3) silty clay loam; a few small pockets of dark grayish-brown (10YR 4/2) silty clay; very weak, coarse, irregular blocky structure; firm when moist, hard when dry; very few roots; a few krotovinas filled with light gray silt; many slightly hard, brittle concretions, ½ to 1½ centimeters in diameter, that have a strong-brown interior; dark-brown stains along old root channels; very strongly acid; clear, irregular boundary; 12 to 20 inches thick.

C_{bg} 39 to 54 inches, pale-brown (10YR 6/3) and yellowish-brown (10YR 5/6) very fine sandy loam; massive; friable; extremely acid.

The depth of the recent alluvium over older deposits ranges from 2 to 4 feet. The amount of mottling varies. The color of the mottles ranges from pale brown to strong brown. In some profiles there is little concretionary material, but in others it is common. A few areas have a pronounced relief of ridges and sloughs. Small areas of Mantachie, Iuka, and Kalmia soils are included.

Nearly all of this soil is in woodland. It is not suited to crops or to improved pasture because of wetness and the hazard of flooding. (Capability unit Vw–1; woodland suitability group 4.)

Bibb, Myatt, and Stough silt loams, overflow (Bc).—About 40 to 50 percent of this complex consists of Bibb silt loam, about 30 percent of Myatt silt loam, and about 20 percent of Stough silt loam. A typical Bibb soil is described on page 17, a typical Myatt soil on page 36, and a typical Stough soil on page 48. These soils are not valuable enough to be worth separating on the map.

All of these soils are poorly drained to somewhat poorly drained and are flooded frequently. A slight to pronounced relief of ridges and sloughs is common. The slope range is 0 to 3 percent. The higher areas are generally occupied by the Myatt and Stough soils, and the Bibb soils lie along the stream channels. This unit is fairly extensive, particularly along Cypress Bayou.

The floodwaters are generally not so deep nor so long lasting on this unit as on the Bibb silt loam; the relief is more pronounced; and the woodland contains more loblolly pine.

Nearly all of the acreage is wooded. Loblolly pine is better suited to the Myatt and Stough soils than to the Bibb soil. These soils are not suitable for crops or improved pasture because they are so wet and so likely to be flooded. (Capability unit Vw–1; woodland suitability group 4.)

Boswell Series

The soils of the Boswell series are moderately well drained, acid, and very slowly permeable. The brown to grayish-brown sandy surface layer is underlain by a red, plastic clay subsoil that is mottled in the lower part.

These soils formed on uplands from thick, acid clays of Coastal Plain origin. They are fairly extensive and widely distributed on the uplands, especially in the northwestern part of the parish.

The soils of this series are associated principally with the Shubuta, Susquehanna, and Sawyer soils. The Boswell soils are less permeable than the Shubuta soils, they have a more plastic subsoil, and their parent materials are less stratified and less varied in texture. They have a thicker unmottled layer in the upper part of the B horizon than the Susquehanna soils have, they are generally less strongly sloping, and the depth to the C horizon is greater. They have redder and finer textured material in the upper part of the B horizon than the Sawyer soils have. The Boswell soils generally lie on stronger or upper slopes, but the Sawyer soils normally occupy the gentle, lower slopes.

The native vegetation was a mixture of upland hardwoods, shortleaf pine, and loblolly pine. Most areas are in woodland. A few gently sloping areas are used for pasture. Almost none is cultivated.

Boswell fine sandy loam, 1 to 5 percent slopes, eroded (Bd).—A typical profile in a moist field formerly cultivated but now idle:

A_p 0 to 7 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; abundant fine grass roots; a few hard, dark-brown concretions; medium acid; abrupt, smooth boundary; 4 to 8 inches thick.

B_2 7 to 17 inches, red (2.5YR 4/8) clay; moderate, fine, angular blocky structure; thin, complete clay films; firm in place, friable when displaced, very plastic when wet; numerous fine grass roots; very strongly acid; clear, smooth boundary; 6 to 12 inches thick.

B_3 17 to 34 inches, dark-red (10R 3/6) clay; common, fine, distinct mottles of light reddish brown (2.5YR 6/4) and a few mottles of gray (10YR 6/1); moderate, fine and medium, angular blocky structure; firm in place, friable when displaced, very plastic when wet; a few grass roots; very strongly acid; gradual, wavy boundary; 12 to 18 inches thick.

C 34 to 50 inches +, gray (7.5YR 6/0) clay; many, fine, prominent mottles of dark red (10R 3/6); weak, fine, angular blocky structure; very firm when moist, very plastic when wet; very strongly acid.

The A horizon is 4 to 8 inches thick. In undisturbed areas an A_1 horizon 2 to 3 inches thick is underlain by an A_2 horizon 4 to 8 inches thick. When the A_p or A_1 horizon is moist, its color ranges from dark grayish brown to dark brown. Where there is an A_2 horizon, it is generally pale brown to grayish brown. The B_2 horizon is red to dark red. In some places the lower part is faintly mottled with yellowish brown. A few areas have a surface layer of very fine sandy loam. Small areas of Shubuta soils and uneroded Boswell fine sandy loam are included.

Most of this soil is in young woodland, mostly of pine. A few areas are in pasture, and a few are idle and have a cover of broomsedge, other grasses, briers, and scattered trees. This soil is probably best suited to pasture or woodland. It can be cultivated if it receives good management that includes adequate fertilization and control of erosion. (Capability unit IIIe–6; woodland suitability group 6.)

Boswell fine sandy loam, 5 to 8 percent slopes, eroded (Be).—The A horizon in this soil is slightly less thick than that of Boswell fine sandy loam, 1 to 5 percent slopes, eroded. In a few spots the B horizon is exposed or has been mixed into the plow layer. A few gullies have cut into the B horizon.

Small areas of uneroded Boswell fine sandy loam and Shubuta fine sandy loam are included.

Most of this soil is in woodland. About 10 percent is in pasture, and 5 percent is idle. A few small fields are cultivated at intervals. This soil is not suited to cultivated crops because of rapid runoff and the difficulty of controlling erosion. Its best use is woodland or pasture. (Capability unit VIe-2; woodland suitability group 6.)

Boswell fine sandy loam, 8 to 20 percent slopes, eroded (Bf).—This soil has a thinner B horizon and more gullies than Boswell fine sandy loam, 1 to 5 percent slopes, eroded.

Small areas of Shubuta and Susquehanna soils are included.

Most of the acreage is in woodland. This is probably the best use for this soil. (Capability unit VIIe-2; woodland suitability group 6.)

Boswell sandy clay, 5 to 8 percent slopes, severely eroded (Bg).—This soil has a finer surface texture than Boswell fine sandy loam, 1 to 5 percent slopes, eroded, and it has numerous shallow gullies. Nearly all of the original sandy surface layer has been washed away, and the B horizon is exposed over most of the area.

This is not an extensive soil. It is not suited to cultivation and is poorly suited to pasture. Most of it is in young loblolly pine. Woodland is its best use. (Capability unit VIIe-2; woodland suitability group 10.)

Bowie Series

The soils of the Bowie series are moderately well drained and acid. Their surface layer is dark grayish-brown to pale-brown fine sandy loam to very fine sandy loam. The subsoil is yellow to yellowish-brown fine sandy loam to sandy clay loam mottled in the lower part with red, yellowish red, or light brownish gray.

These soils formed from sandy Coastal Plain sediments. They are associated in this parish principally with the Savannah soils. They are somewhat similar to the Savannah soils, but they have slightly better drainage and less mottling. They do not have the fragipan that is characteristic of the Savannah soils, and, except where they are transitional to the Savannah soils, they do not have hard concretions in the B horizon.

In this parish, the Bowie soils are associated with the Savannah soils in such an intricate pattern that they are mapped only in complexes with them. These mapping units are described under the Savannah series. A profile of a Bowie soil is described on page 45.

Buxin Series

The soils of the Buxin series are somewhat poorly drained, clayey, alluvial soils on the bottom lands of the Red River. The predominantly reddish-brown surface and subsurface layers are underlain at a depth of 20 to 30 inches by a dark-gray layer 6 to 15 inches thick. This grades into a layer of clay in variegated colors of dark gray, gray, dark brown, and reddish brown. The reaction of the various layers ranges from medium acid to moderately alkaline.

The Buxin soils formed from alluvium that consisted principally of sediments from red beds. They are extensive and generally occur in large areas.

Soils of the Buxin series are associated with the Miller, Roebuck, Perry, and Gallion soils. The Miller soils are red and are alkaline or calcareous throughout. The Roebuck soils have faint to distinct mottles in the subsoil, but they are not distinctly stratified or gleyed as the Buxin soils are. The Perry soils are poorly drained. They are underlain by red clay, but the surface layer to a depth of a few feet is gray to light gray. The Gallion soils are generally less clayey than the Buxin soils, and their subsoil is more distinct.

The Buxin soils are used for cotton, corn, oats, hay, and pasture. The natural fertility is high. When the soils are adequately drained and well managed, yields of most crops are moderately high. The native vegetation was bottom-land hardwoods.

Buxin clay, 0 to 1 percent slopes (Bh).—A typical profile 4.5 miles east of Bossier City along U.S. Highway 80, in a moist, idle area under a cover of bermudagrass:

A_p 0 to 6 inches, dark reddish-brown (5YR 3/3) clay; strong, medium and coarse, subangular blocky structure; very firm when moist, hard when dry, and very plastic and sticky when wet; many fine roots massed on the faces of the aggregates; slightly acid to neutral; clear, smooth boundary; 2 to 8 inches thick.

C_1 6 to 21 inches, dark reddish-brown (5YR 3/4) clay; moderate, fine and medium, angular blocky structure; very firm when moist, very hard when dry, very plastic and sticky when wet; a few fine roots on the faces of the aggregates; the lower part of this horizon contains a few tubular spaces, filled with gray clay; neutral to slightly calcareous in the lower part of the horizon; abrupt, smooth boundary; 6 to 24 inches thick.

C_{g1b} 21 to 31 inches, dark-gray (N 4/0) clay that has about 10 percent medium and coarse, prominent mottles of dark reddish brown (5YR 3/4); moderate, medium and coarse, subangular blocky structure; firm when moist, hard when dry, very plastic and sticky when wet; mildly alkaline; clear, smooth boundary; 4 to 15 inches thick.

C_{g2b} 31 to 42 inches, variegated dark grayish-brown (10YR 4/2), dark-brown (7.5YR 4/4), and reddish-brown (5YR 4/4) clay; moderate, fine, angular blocky structure; very firm when moist, very hard when dry, very plastic and very sticky when wet; a few fine roots on faces of aggregates; mildly alkaline; clear, wavy boundary; 10 to 20 inches thick.

C_{3b} 42 to 48 inches +, red (10R 4/6) clay; weak, fine, angular blocky structure; firm when moist, hard when dry, plastic and sticky when wet; calcareous.

The A_1 or A_p horizon in some places is dusky red, dark red, or reddish brown. The C_1 horizon is reddish brown in most places, but in a few places it is dark red or red or has a few brown or yellowish-brown mottles. The structure of the C_1 horizon is weak blocky or strong blocky.

This soil is less than 30 inches thick above the C_g layers. The C_{g1b} horizon is clay loam, silty clay loam, silty clay, or clay. In many places at the upper boundary of the C_{g1b} horizon, there is a thin, very dark colored layer of silt loam; this is apparently a buried A_1 horizon.

The depth to the C_{g1b} layer ranges from about 21 inches to 48 inches or more. In a few areas, the C_{g1b} and C_{g2b} horizons are several feet thick and are gray rather than dark gray.

Small areas that have a surface layer of silty clay are included. There are also small areas of Roebuck soils.

The permeability of this soil is very slow. Adequate surface drainage must be provided for best yields of crops and improved pasture. (Capability unit IIIw-1; not suited to pines but can be used to grow hardwoods.)

Buxin clay, 1 to 3 percent slopes (Bk).—The profile of this soil is similar to that of Buxin clay, 0 to 1 percent slopes. There is a slight to moderate hazard of erosion, which must be considered in management. As a result, slightly more of this soil is used for pasture or hay. With good management, it is suited to cultivated crops, hay, or pasture. (Capability unit IIIe-1; not suited to pines but can be used to grow hardwoods.)

Buxin clay, undulating (Bm).—This soil differs from Buxin clay, 0 to 1 percent slopes, in having uneven slopes, generally of 0 to 3 percent. These lie in a pattern of narrow ridges, short slopes, and winding depressions. Surface drainage is necessary to prevent excess water from standing in the numerous low spots. The uneven moisture conditions cause considerable variation in readiness for tillage, in crop growth, and in time of crop maturity.

With good management, this soil is suited to cultivated crops, but most of it is in hay or pasture. (Capability unit IIIw–2; not suited to pines but can be used to grow hardwoods.)

Buxin complex, 0 to 3 percent slopes (Bn).—This complex consists of a series of low ridges and shallow depressions. The profile of the soil in the depressions is very similar to that of Buxin clay, 0 to 1 percent slopes.

On the ridges, the clayey, reddish-brown A and C_1 horizons are underlain by an older buried soil. The buried soil had a thin, dark-gray A_{1b} horizon of loam or silt loam, underlain by one or more horizons of medium acid sandy loam to sandy clay loam mottled or variegated in colors of grayish brown, yellowish brown, and yellowish red.

This complex covers a fairly large area, but it is all near the place where Cypress Bayou enters the flood plain of the Red River. It probably formed from relatively shallow deposits of clay brought in by backwaters of the Red River and deposited in slack water over an old, braided, alluvial plain of Cypress Bayou.

Most of this soil is in improved pasture. It is protected from flooding by a ring levee. This soil can be cultivated, but it is probably best suited to pasture. (Capability unit IIIw–2; not suited to pines but can be used to grow hardwoods.)

Buxin complex, overflow, 0 to 3 percent slopes (Bo).—This complex is like Buxin complex, 0 to 3 percent slopes, except that it has not been protected from frequent flooding. Flooding makes these areas unsuitable for crops or improved pasture. The best use for this complex is woodland. (Capability unit Vw–2; not suited to pines but can be used to grow hardwoods.)

Buxin silty clay loam, 0 to 1 percent slopes (Bu).—The profile of this soil is like that of Buxin clay, 0 to 1 percent slopes, except that the A_p horizon and, in most places, the C_1 horizon are coarser textured. The A horizon is silty clay loam. The C_1 horizon is either silty clay loam or silty clay.

Most of this soil is used for cultivated crops or pasture. It is well suited to both. Excess surface water, which must be removed by artificial drainage, is a moderate problem. (Capability unit IIw–1; not suited to pines but can be used to grow hardwoods.)

Cahaba Series

The soils of the Cahaba series are well drained, slightly acid to medium acid, and moderately permeable. They have a dark-brown to brown, sandy surface layer and a yellowish-red, slightly finer textured subsoil.

These soils formed from old alluvium washed from the Coastal Plain and from red beds. They are fairly extensive on the broad stream terraces, especially in the eastern and southeastern parts of the parish. Smaller areas lie along the smaller streams.

The Cahaba soils are associated with the Tilden, Kalmia, Prentiss, and Amite soils. They lack the distinct fragipan that is characteristic of the Tilden soils and Prentiss soils. They are redder than the Kalmia soils and less red than the Amite soils. The Amite soils have a more distinct subsoil.

The native vegetation on these areas was chiefly oak, hickory, sweetgum, blackgum, loblolly pine, and shortleaf pine. The Cahaba soils were among the first soils in this parish cleared for cultivation. Most areas, even those that now support pines of sawlog size, have been cultivated. At present, about half of the cleared land is used for cotton, corn, oats, and truck crops, and the rest is in pasture.

These soils have low natural fertility, but they are very responsive to good management. Nearly all of the acreage is suitable for cultivation. The soils are also well suited to most pasture plants and to pine trees.

Cahaba fine sandy loam, 1 to 5 percent slopes (Ca).—A typical profile in a moist field formerly cultivated but now in 12-year-old loblolly pine:

A_p 0 to 8 inches, dark-brown (7.5YR 4/4) fine sandy loam; weak, fine and medium, granular structure; very friable; abundant fine and medium roots; slightly acid; abrupt, smooth boundary; 7 to 9 inches thick.

B_1 8 to 18 inches, yellowish-red (5YR 4/6) fine sandy loam; weak, fine, subangular blocky and weak, medium, granular structure; friable when moist, slightly sticky when wet; numerous fine and medium roots; medium acid; clear, smooth boundary; 8 to 12 inches thick.

B_2 18 to 32 inches, yellowish-red (5YR 4/6) loam; fine and medium, subangular blocky structure; firm in place, friable when crushed; a few faint clay films in pores; numerous fine roots; medium acid; gradual, smooth boundary; 12 to 16 inches thick.

B_3 32 to 44 inches, yellowish-red (5YR 4/6) fine sandy loam; a few small spots of light brown (7.5YR 6/4); weak, medium and fine, subangular blocky structure; friable; a few small, hard, brown concretions; a few fine roots; medium acid; gradual, smooth boundary; 10 to 14 inches thick.

C 44 to 50 inches +, yellowish-red (5YR 4/6) fine sandy loam; common, medium-sized splotches of light brown (7.5YR 6/4); weak, fine, subangular blocky structure; very friable; medium acid.

The depth of the A horizon ranges from about 6 to 16 inches. Its color is dark yellowish brown to dark brown. The color of the B horizon ranges from dark brown to yellowish red. The texture of the B_2 horizon in most places is loam or sandy clay loam. In a few places there is about 10 percent faint mottling in the B_3 horizon.

Most areas of this soil have slopes of less than 3 percent. A few small areas have a surface layer of loamy fine sand or very fine sandy loam.

This soil is suitable for cultivated crops. It is well suited to most pasture plants and to pine. (Capability unit IIe–3; woodland suitability group 2.)

Cahaba fine sandy loam, 1 to 5 percent slopes, eroded (Cb).—This soil has a thinner surface layer than Cahaba fine sandy loam, 1 to 5 percent slopes. In most places this layer is 4 to 6 inches thick. In some spots the B horizon has been mixed with the remainder of the A horizon and gives it a reddish-brown color. A few shallow gullies have cut into the B horizon. This soil has a slightly stronger average slope than the uneroded phase.

In use and suitability, this soil is similar to Cahaba fine sandy loam, 1 to 5 percent slopes, but yields are usually slightly less. (Capability unit IIe-3; woodland suitability group 2.)

Cahaba fine sandy loam, 5 to 8 percent slopes, eroded (Cc).—This soil has a thinner surface layer than Cahaba fine sandy loam, 1 to 5 percent slopes, and it has numerous shallow gullies and galled spots. The upper part of the B horizon has been mixed into the plow layer over about one-third of most areas.

This soil is suitable for most of the same crops as Cahaba fine sandy loam, 1 to 5 percent slopes, but yields are usually less. This soil is more susceptible to erosion. Rotations should include more of the high-residue crops. (Capability unit IIIe-4; woodland suitability group 2.)

Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded (Cd).—The surface layer of this soil is slightly finer textured and, in most places, thinner than that of Cahaba fine sandy loam, 1 to 5 percent slopes; otherwise, the profiles of the two soils are similar. The present use, suitability for crops, and management needs are the same. (Capability unit IIe-3; woodland suitability group 2.)

Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes (Cf).—Cahaba very fine sandy loam, 1 to 5 percent slopes, and Kalmia very fine sandy loam, 1 to 5 percent slopes, are mapped in the same unit because both are small in extent and their important properties are generally similar.

The Cahaba soil in this unit is like Cahaba fine sandy loam, 1 to 5 percent slopes, except that the surface layer is slightly finer in texture.

The Kalmia soils have a grayish-brown, sandy surface layer and a yellowish-brown subsoil. They are moderately well drained. A typical Kalmia soil is described on page 26.

This is not a very extensive unit. Its crop suitability, yields, and management requirements are generally the same as those of Cahaba fine sandy loam, 1 to 5 percent slopes. (Capability unit IIe-3; woodland suitability group 2.)

Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes (Ct).—About 65 percent of this complex is made up of Cahaba very fine sandy loam, and about 35 percent is Tilden fine sandy loam. These soils are so small in area and so closely associated that separation on the map is not practical. A profile of a typical Cahaba soil is described on page 20, and one of a typical Tilden soil is described on page 50.

The present use of the soils in this complex and their suitability for crops are the same as those of Cahaba fine sandy loam, 1 to 5 percent slopes. (Capability unit IIe-3; woodland suitability group 2.)

Chastain Series

The soils of the Chastain series are very poorly drained and are frequently flooded. They are slightly acid to very strongly acid. The gray, mottled clay surface layer is underlain by strongly gleyed, gray, clayey subsurface layers mottled in various shades of brown and yellowish red.

These soils formed from fine-textured alluvium that washed from soils of the uplands and from dissected stream terraces. The Chastain soil in this parish lies only along the lower flood plains of Bodcau Bayou and Cypress Bayou. The slope is less than 1 percent, and there are many depressions. Deep floodwater often covers these areas for several months of the year. At other times, there are many ponded areas and shallow seasonal lakes.

The native vegetation is water-tolerant trees: cypress, overcup oak, willow oak, and water elm. Near old lake beds the vegetation consists of scattered large cypress trees, thickets of water elm and buttonbush, and sedges that cover the openings in the woodland. It would probably be necessary to control the floods before more desirable trees could be substituted for the native woodland. At present, these areas are useful only for woodland and as a home for wildlife.

Chastain clay (Cy).—The slope range of this soil is 0 to 1 percent. A typical profile:

A_{11g} 0 to 2 inches, gray (10YR 5/1 to 10YR 6/1) clay prominently stained with yellowish red on faces between aggregates and around roots; moderate, medium, subangular blocky structure; firm when moist, hard when dry, moderately plastic when wet; many fine fibrous roots that are matted; slightly acid; clear, wavy boundary; 1 to 3 inches thick.

A_{12g} 2 to 6 inches, gray (10YR 5/1 to 10YR 6/1) clay; a few, fine, distinct mottles of strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; very firm when moist, plastic when wet; a few roots; strongly acid; gradual, wavy boundary; 3 to 6 inches thick.

C_1 6 to 24 inches, gray (10YR 6/1) clay; common, medium, distinct mottles of yellowish brown (10YR 5/6); weak to very weak, coarse, subangular blocky structure; plastic when wet; no living roots; strongly acid; clear, smooth boundary; 15 to 24 inches thick.

C_2 24 to 42 inches +, light brownish-gray (2.5Y 6/2) clay; many, coarse, prominent mottles of yellowish brown (10YR 5/6) and yellowish red (5YR 4/6); weak, very coarse, subangular blocky structure to massive; plastic when wet; medium acid.

The A_{11g} horizon described above is typical of this soil in ponded areas where cypress, buttonbush, and water elm grow. In other areas where oaks are dominant, the matted roots are absent.

Some profiles have less mottling than the one described. The lower part of the C horizon may contain pockets of light-gray sand in a few places. In most places this soil is underlain by light-gray loamy fine sand at a depth of 5 to 6 feet. In some areas the surface layer is silty clay rather than clay. (Capability unit Vw-1; not suited to pines but can be used to grow hardwoods.)

Cuthbert Series

The soils of the Cuthbert series are moderately well drained. They have a grayish-brown to light yellowish-brown surface layer underlain by a compact, mottled, yellowish-red, strong-brown, and pale-brown subsoil.

These soils formed on the uplands from beds of Coastal Plain clay and sand. They are associated chiefly with the Shubuta, Boswell, Susquehanna, and Kirvin soils. Their parent material was like that of the Shubuta soils, but they have thinner A and B horizons, and their B horizon is less well expressed and more variable. They formed in more stratified, lighter textured parent material and are somewhat more permeable than the Boswell and Susquehanna soils. They are not so red nor so friable as the Kirvin soils.

The native vegetation was a mixed forest of upland hardwoods and pine, principally shortleaf pine.

In Bossier Parish, the Cuthbert soils have been mapped only in an undifferentiated unit with Shubuta soils. A profile of a Cuthbert soil is described under Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes, on page 48.

Eustis Series

The soils of the Eustis series are excessively drained and sandy. They consist of brown loamy fine sand to a depth of about 20 to 30 inches. This is underlain by a yellowish-red subsoil of loamy fine sand.

The Eustis soils formed in coarse-textured Coastal Plain materials. The slope range is 1 to 20 percent.

These soils are associated with the Lakeland soils. In this parish, the two soils were mapped in undifferentiated units. Since the Lakeland soils are the more extensive, the units are described under the Lakeland series. A detailed profile of a typical Eustis soil is given on page 29, under Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes.

Gallion Series

The soils of the Gallion series are moderately well drained to well drained. Their subsoil layers are not very distinct. They have a medium-textured to fine-textured surface layer underlain by a medium-textured to moderately fine textured subsoil.

These are fairly extensive soils. They lie along tributaries and old natural levees of the Red River, principally along the eastern side of the flood plain. They formed chiefly from reddish alluvial sediments of the Red River, but partly from sediments of tributary streams.

In most places the Gallion soils are associated with the Roebuck, the Buxin, and the Perry soils. In a few places they are associated with the Yahola and the Miller soils. They are coarser textured and better drained than the Roebuck, Buxin, and Miller soils, and their subsoil is more distinct. They are better drained and coarser textured than the Perry soils. The Yahola soils are more alkaline than the Gallion soils, and they lack a B horizon.

The native vegetation consisted of bottom-land hardwoods—cherrybark oak, water oak, cottonwood, sweetgum, pecan, Nuttall oak, elm, and a little cypress.

These soils are used chiefly for cotton, corn, hay, and improved pasture. They are moderately to highly productive with good management.

Gallion silt loam, 0 to 1 percent slopes (Gd).—A typical profile in moist, fallow cropland:

A_p 0 to 13 inches, brown (7.5YR 5/4) silt loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary; 12 to 14 inches thick.

B_2 13 to 25 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; a few thin, incomplete clay films on vertical faces of the aggregates; firm; medium acid; gradual, smooth boundary; 10 to 13 inches thick.

B_3 25 to 39 inches, yellowish-red (5YR 4/6) silt loam; weak, medium, subangular blocky structure; friable; slightly acid; clear, smooth boundary; 12 to 15 inches thick.

C 39 to 46 inches +, yellowish-red (5YR 4/6) very fine sandy loam; common, medium and coarse mottles of light brown (7.5YR 6/4); very weak, medium, subangular blocky structure to massive; very friable; slightly acid.

The color of the surface layer in some areas is dark brown or dark grayish brown. The subsoil ranges in color from reddish brown to yellowish red and in texture from heavy silt loam to clay loam. The reaction ranges from medium acid to mildly alkaline. Clay films are lacking in some places, but the weak to moderate structure of the B horizon is characteristic. The lower part of the B horizon and the C horizon have some mottling in a few places. The parent materials are stratified silt loam, silty clay, and sandy loam.

Nearly all of this soil has been cleared. It is used principally for cultivated crops, hay, and pasture. It is well suited to the common cultivated crops and to most hay and pasture plants. (Capability unit I–2; not suited to pines but can be used to grow hardwoods.)

Gallion silt loam, 1 to 3 percent slopes (Gg).—This soil is much like Gallion silt loam, 0 to 1 percent slopes. The management differs somewhat because of the slight to moderate hazard of erosion. Otherwise, the two soils are similar in use and suitability. (Capability unit IIe–2; not suited to pines but can be used to grow hardwoods.)

Gallion silt loam, 3 to 5 percent slopes (Gh).—The profile of this soil is similar to that of Gallion silt loam, 0 to 1 percent slopes, except for the effects of erosion. Small areas that are moderately eroded have a reddish-brown surface layer because part of the B horizon has been mixed with the A horizon in the plow layer.

Yields of most cultivated crops are not so high on this soil as they are on Gallion silt loam, 0 to 1 percent slopes, and a larger proportion of the acreage is used for hay or pasture. The moderate hazard of erosion creates a management problem. (Capability unit IIIe–3; not suited to pines but can be used to grow hardwoods.)

Gallion clay, overwash, 0 to 1 percent slopes (Ga).—Below a depth of 6 to 16 inches, this soil is much like Gallion silt loam, 0 to 1 percent slopes. The upper layers, or overwash, are finer in texture. They appear to have formed from fine-textured sediments that were deposited in slack water over the medium-textured sediments of the natural levees. Apparently there was time for the original Gallion soil to form on the natural levees and for the horizons to develop differences before the finer deposits were laid on above them as overwash. A typical profile in a moist, cultivated field:

A_p 0 to 5 inches, dark reddish-brown (5YR 3/2) clay; strong, coarse, subangular blocky structure that breaks down into moderate, medium, granular structure; firm when moist, plastic when wet; neutral; abrupt, smooth boundary; 4 to 6 inches thick.

C 5 to 12 inches, dark reddish-brown (5YR 3/4) clay; strong, coarse, angular blocky structure; very firm when moist, very plastic when wet; neutral; abrupt, slightly wavy boundary; 6 to 10 inches thick.

B_{2b} 12 to 16 inches, dark-brown (7.5YR 4/4) to reddish-brown (5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; a few thin, very patchy clay films on blocks; firm; slightly acid; gradual, smooth boundary; 3 to 6 inches thick.

B_{3b} 16 to 36 inches, yellowish-red (5YR 4/6) silt loam; weak, medium, subangular blocky structure; friable; neutral.

C_b 36 to 48 inches +, yellowish-red (5YR 4/6) stratified silt loam and very fine sandy loam; a few light-brown (7.5YR 6/4) spots and streaks; massive; very friable; slightly acid to neutral.

The overwash layers range from about 6 to 16 inches in thickness. The colors range from very dark grayish brown (10YR 3/2) to dark brown (7.5YR 4/2) and to reddish brown. In a few places the layer immediately below the fine-textured overwash is silt loam. A few small areas have a surface layer of silty clay or silty clay loam.

The texture of the surface layer is less favorable for cultivated crops than that of Gallion silt loam, 0 to 1 percent slopes. A greater proportion of this soil is in pasture or hay. Intensive drainage is required for row crops because of the clay texture of the overwash and the flat topography. (Capability unit IIIw–1; not suited to pines but can be used to grow hardwoods.)

Gallion clay, overwash, 1 to 3 percent slopes (Gb).—This soil is similar to Gallion clay, overwash, 0 to 1 percent slopes, but its stronger slopes make control of runoff necessary. Rows should be graded to slow runoff, and close-growing vegetation should be grown to protect the soil from erosion. Small areas where water collects need drainage.

A considerable percentage of this soil is used for hay or pasture. Occasionally, a row crop or a broadcast crop is grown in the rotation. (Capability unit IIIe–1; not suited to pines but can be used to grow hardwoods.)

Gallion clay, overwash, undulating (Gc).—This soil has uneven, complex slopes of 0 to 3 percent. It consists of a series of narrow winding ridges and depressions.

This soil is suited to about the same crops as Gallion clay, 0 to 1 percent slopes. Yields are generally lower. Adequate drainage is more difficult to provide. (Capability unit IIIw–2; not suited to pines but can be used to grow hardwoods.)

Gallion silty clay loam, 0 to 1 percent slopes (Gk).—The surface layer of this soil is finer textured than that of Gallion silt loam, 0 to 1 percent slopes, and the B horizon is less distinct.

In most places the dark-brown (7.5YR 4/2) surface layer is 4 to 10 inches thick. In some places it is underlain by a 3- to 5-inch layer of dark grayish-brown (10YR 4/2) or very dark grayish-brown (10YR 3/2) silt loam. Beneath this layer is a layer of yellowish-red (5YR 5/4 to 5YR 4/6) silt loam or stratified silt loam and silty clay loam.

About 60 percent of this soil is cultivated. Cotton, corn, and oats are the main crops. About 35 percent is used for pasture or hay, and about 5 percent is wooded. (Capability unit IIw–2; not suited to pines but can be used to grow hardwoods.)

Gallion soils, mounded, 0 to 1 percent slopes (Gm).—This is a complex of Gallion soils in which the surface texture ranges from very fine sandy loam to silty clay. It is characterized by low sandy mounds and by intermound areas that have a clayey surface texture. Some areas have been so nearly leveled by tillage that the mounds show up only as lighter colored sandy spots (fig. 6). In general, the soils of this complex are like Gallion silt loam, 0 to 1 percent slopes.

This complex is not extensive. Most of it is on the natural levees along Stillhouse Bayou in the northwestern part of the parish.

A large percentage of this complex is used for pasture or hay. Drainage is a moderate problem. The uneven moisture conditions and surface textures cause uneven crop stands and varying degrees of crop maturity. (Capability unit IIw–2; not suited to pines but can be used to grow hardwoods.)

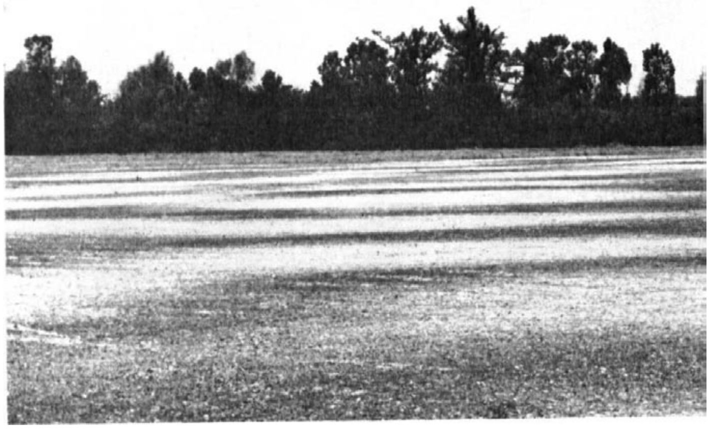

Figure 6.—**The variations in surface texture of Gallion soils, mounded, are still evident after the mounds have been leveled. The light areas are very fine sandy loam, and the dark areas are silty clay.**

Gore Series

The soils of the Gore series are somewhat poorly drained to moderately well drained, strongly to very strongly acid, and very slowly permeable. The horizons are not very distinct. The grayish-brown surface layer is underlain by a thin, mottled B horizon of yellowish-red and yellowish-brown clay. The upper part of the parent material is variegated red, yellow or brown, and gray clay. The lower part is predominantly red alkaline clay.

These are extensive soils, widely distributed on the dissected parts of the broad stream terraces. They formed from sediments derived chiefly from red beds.

The Gore soils are associated chiefly with the Acadia, McKamie, Hortman, and Morse soils. They have thinner horizons than the Acadia soils, and they generally lie on more strongly sloping, more dissected areas. They are not so well drained as the McKamie and Hortman soils, and they are more mottled. The Gore soils are acid to a depth of 24 to 40 inches, while the Morse soils are mildly to strongly alkaline and generally contain calcareous concretions. The Morse soils are not mottled.

The native vegetation was principally hardwood trees. Post oak was the most common species. Shortleaf pine and loblolly pine were minor species in the stand.

Only a few areas of Gore soils have been cleared, and most of these have returned to woodland. A few small open areas are in pasture, and a few small areas are cultivated at times. These soils are not suited to continuous cropping. They are poorly suited to fairly well suited to pasture. Woodland is probably the best use for most areas.

Gore very fine sandy loam, 1 to 5 percent slopes (Gr).—A typical profile in a moist, wooded area:

A_0 ½ inch to 0, partly decomposed leaf litter from oaks.

A_1 0 to 1 inch, dark grayish-brown (10YR 4/2) to very dark grayish-brown (10YR 3/2) very fine sandy loam; weak, fine, crumb structure; very friable; abundant fine roots; strongly acid; clear, smooth boundary; 1 to 2 inches thick.

A_2 1 to 6 inches, grayish-brown (10YR 5/2) very fine sandy loam; very weak, fine, crumb structure; very friable; numerous roots; a few hard, dark-brown concretions and strong-brown stains around roots; very strongly acid; abrupt, smooth boundary; 4 to 7 inches thick.

B_2 6 to 11 inches, yellowish-red (5YR 5/6) clay; common, fine and medium, distinct mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; a few thin, patchy, red clay films on blocks, very firm when moist, very hard when dry, very plastic when wet; roots are common; very strongly acid; clear, smooth boundary; 4 to 6 inches thick.

C_1 11 to 18 inches, variegated yellowish-red (5YR 4/6), yellow (10YR 7/6), and light-olive (5Y 6/3) clay; moderate, medium, subangular blocky structure; very firm when moist, very hard when dry, very plastic when wet; a few fine roots; very strongly acid; clear, smooth boundary.

C_2 18 to 54 inches, red (2.5YR 4/8) clay; many, fine and medium mottles of light brownish gray (2.5Y 6/2); massive (structureless) to very weak, coarse, prismatic structure; very firm when moist, very hard when dry, very plastic when wet; only a few roots; very strongly acid; clear, wavy to irregular boundary; 24 to 40 inches thick.

C_3 54 to 65 inches, red (2.5YR 4/6) clay; a few prominent spots and streaks of pinkish gray (7.5YR 7/2); massive (structureless) to coarse blocky structure; mildly alkaline.

The B_2 horizon of this soil ranges in thickness from about 3 to 8 inches. The depth to the C horizon ranges from about 8 to 18 inches.

In some areas the surface layer is silt loam. In a few very small areas, as a result of erosion, the surface layer is clay loam. Small areas of Hortman and Acadia soils are included.

This is an extensive soil. It is chiefly in woodland of pines and hardwoods. It is fairly well suited to loblolly pine and shortleaf pine. If limed and fertilized it is fairly well suited to most grasses. A few small areas are in pasture. (Capability unit VIe-2; woodland suitability group 10.)

Gore very fine sandy loam, 1 to 5 percent slopes, eroded (Gs).—Because of erosion, this soil has a thinner surface layer than Gore very fine sandy loam, 1 to 5 percent slopes. It has a few shallow gullies and a few areas where the subsoil is exposed.

Most of this soil is in woodland, which is its best use. It is probably less well suited to pasture, but a few small areas are used for pasture. (Capability unit VIe-2; woodland suitability group 10.)

Gore very fine sandy loam, 5 to 16 percent slopes, eroded (Gv).—This soil has a thinner surface layer than Gore very fine sandy loam, 1 to 5 percent slopes. In many areas the subsoil is exposed. Shallow gullies are common in cultivated fields.

This is not an extensive soil. Most of it is in woodland, which is its best use. It is not suited to cultivation and is poorly suited to pasture. (Capability unit VIIe-2; woodland suitability group 10.)

Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded (Go).—This is an undifferentiated unit that consists of one or more soils in each of the Gore, McKamie, and Hortman series. Individual areas may consist of one soil or of more than one. They are mapped in the same unit because there are no significant differences in their use and management. A typical Gore soil is described on page 23, a typical McKamie soil on page 31, and a typical Hortman soil on page 25.

Large gullies are characteristic of these soils. Nearly all or all of the surface layer and part of the subsoil have been removed by erosion.

Nearly all areas are in woodland. Idle areas have scattered trees. Woodland is the only suitable use for these soils. (Capability unit VIIe-2; woodland suitability group 10.)

Hannahatchee Series

The soils of the Hannahatchee series are moderately well drained to well drained, acid, alluvial soils. They formed chiefly from sediments that washed from the Nacogdoches and Kirvin soils. The Hannahatchee soils are very inextensive. They occur near Redland, on narrow stream bottoms and fanlike foot slopes below very strongly sloping areas of red to dark-red soils of the uplands.

These soils are associated principally with the Nacogdoches and Kirvin soils and with Mixed alluvial land. They are not so well drained as the Nacogdoches and Kirvin soils, and they do not have such well differentiated horizons. They have redder, more uniform profiles than Mixed alluvial land, and they generally are less likely to be flooded.

The native vegetation was principally hardwoods and some loblolly pine. Most areas are in pasture. A few areas are cultivated.

Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes (Ha).—This is the only Hannahatchee soil mapped in Bossier Parish. A typical profile in moist, idle cropland:

A_p 0 to 6 inches, strong-brown (7.5YR 5/6) fine sandy loam; weak, medium, granular structure; very friable; medium acid; abrupt, smooth boundary; 5 to 7 inches thick.

C 6 to 30 inches, dark-red (2.5YR 3/6) loam; weak, medium and coarse, subangular blocky structure; very friable; medium acid; abrupt, wavy boundary.

D_1 30 to 46 inches, strong-brown (7.5YR 5/8) sandy loam; massive; friable when moist, hard when dry; very strongly acid; gradual, wavy boundary; 12 to 20 inches thick.

D_2 46 to 54 inches +, strong-brown (7.5YR 5/8) silt loam that has many, medium to coarse, prominent mottles and veins of light gray (10YR 7/1); massive (structureless); a few light-gray clay films in veins and streaks of light-gray silt; friable when moist, slightly sticky when wet, hard and brittle when dry; 10 to 30 percent of volume consists of hard, reddish-brown concretions that have a black interior; very strongly acid.

The color of the A horizon ranges from strong brown to reddish brown. The depth to the D_1 horizon ranges from 24 to 50 inches. Some of the deeper profiles have a few patchy clay films, and some have a slight difference in texture between the surface layer and the subsurface layer. Most of the slopes are less than 3 percent.

Most areas are flooded occasionally. Some minor scouring takes place, and material is deposited locally. (Capability unit IIw-5; woodland suitability group 1.)

Hortman Series

The soils of the Hortman series are moderately well drained, acid, and very slowly permeable. Their surface layer is grayish brown and sandy. It is underlain by a red clay subsoil that is prominently mottled with gray in the lower part.

These soils formed on stream terraces from old alluvium derived chiefly from red beds. They are fairly extensive. Most areas are small to medium in size. They are widely distributed on dissected parts of the broad stream terraces.

The Hortman soils are associated chiefly with the Muskogee, Gore, and McKamie soils. They are redder than the Muskogee soils. They are better drained and less mottled in the upper subsoil than the Gore soils. They are less well drained and more mottled than the McKamie soils, and the lower part of their subsoil is more uniform.

The native vegetation was a mixture of upland hardwoods, shortleaf pine, and loblolly pine. Most areas are now in woodland. Only a small acreage is open. It is used principally for pasture or is cultivated intermittently. Many old fields have reseeded to pines.

Hortman very fine sandy loam, 1 to 5 percent slopes, eroded (Hn).—A typical profile in a moist, old field covered with 25-year-old pines:

A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) very fine sandy loam; moderate, medium, crumb structure; very friable; abundant fine roots; medium acid; abrupt, smooth boundary; 4 to 8 inches thick.

B_2 6 to 14 inches, red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; thin, patchy clay films on faces of blocks; very firm when moist, very plastic when wet, hard when dry; numerous fine and medium roots; strongly acid; clear, smooth boundary; 6 to 8 inches thick.

B_3 14 to 26 inches, dark-red (2.5YR 3/6) clay; many, fine and medium, prominent mottles of light brownish gray (10YR 6/2); compound structure—moderate, medium, subangular blocky and very fine, subangular blocky; firm when moist, very plastic when wet; fine roots common; strongly acid; gradual, smooth boundary; 12 to 18 inches thick.

C_1 26 to 50 inches, dark-red (2.5YR 3/6) clay; many, medium, prominent mottles of light brownish gray (2.5Y 6/2); weak, coarse, subangular blocky structure; very firm when moist, very plastic when wet, very hard when dry; few roots; very strongly acid; gradual, wavy boundary; 15 to 20 inches thick.

C_2 50 to 56 inches, red (2.5YR 4/6) clay; a few spots and pockets of brown (7.5YR 5/4); massive (structureless) to coarse blocky structure; mildly alkaline.

In most old fields and recently cultivated areas, the A_p horizon is grayish brown (10YR 5/2). The A horizon is commonly from 3 to 8 inches thick. A few areas that have never been cultivated have not been eroded—their A horizon in some places is as much as 12 inches thick. The B_2 horizon ranges from red to dark red in color and from 6 to 10 inches in thickness. In most places, mildly alkaline to moderately alkaline clay lies at a depth of 50 to 60 inches.

Small areas of Gore and McKamie soils are included in this unit, particularly in heavily wooded areas.

This is a fairly extensive soil. In the past, about half the acreage was cleared and cultivated, but more than 60 percent of this has returned to woodland. This soil is fairly well suited to some cultivated crops, but it is probably best used as pasture or woodland because of its very slow permeability and the hazard of erosion. (Capability unit IIIe-6; woodland suitability group 6.)

Hortman very fine sandy loam, 5 to 8 percent slopes, eroded (Hr).—This soil has a profile similar to that of Hortman very fine sandy loam, 1 to 5 percent slopes, eroded, but, because of the severe hazard of erosion, it is not suited to cultivation. It is fairly well suited to pasture. It is moderately productive of pine. (Capability unit VIe-2; woodland suitability group 6.)

Huckabee Series

The soils of the Huckabee series are very sandy, deep, excessively drained, thoroughly leached, and rapidly permeable. The surface layer is gray, grayish brown, or brown. It is underlain by a dominantly brown, sandy subsoil more than 40 inches thick.

These soils formed on stream terraces from old, sandy alluvium derived principally from red beds. They are not very extensive in this parish.

The Huckabee soils are associated principally with the Amite and Cahaba soils. They are coarser textured and less red than either. The B horizon does not differ much from the A horizon in texture, but the difference in color is fairly distinct.

The native vegetation was a mixture of pine and upland hardwoods. Small areas have been cleared and cultivated, but most of the acreage is now in woodland.

Huckabee loamy fine sand, 1 to 5 percent slopes (Hs).—The profile of this soil is like that of Huckabee loamy fine sand, 5 to 20 percent slopes. There is only a small acreage of this soil, and most of it is idle or in woodland. It is fairly well suited to special crops, such as watermelons or peanuts. It is poorly suited to the common cultivated crops, such as corn or cotton. It is poorly suited to most pasture and hay crops. Probably the best use for most areas is woodland. (Capability unit IIIs-1; woodland suitability group 8.)

Huckabee loamy fine sand, 5 to 20 percent slopes (Hu).—A typical profile in undisturbed forest of pine and hardwoods:

A_0 ¾ inch to 0, dark-gray, partly decomposed forest litter.

A_1 0 to 3 inches, dark-gray (10YR 4/1) loamy fine sand; weak, fine, crumb structure; very friable when moist, loose when dry; abundant roots; slightly acid; clear, smooth boundary; 2 to 4 inches thick.

A_2 3 to 8 inches, brown (10YR 5/3) loamy fine sand; essentially structureless; very friable when moist, loose when dry; abundant roots; medium acid; clear, wavy boundary; 4 to 6 inches thick.

B 8 to 20 inches, dark-brown (7.5YR 4/4) loamy fine sand; structureless; very friable; medium and fine roots common; medium acid; gradual, smooth boundary; 11 to 13 inches thick.

C 20 to 80 inches +, reddish-yellow (7.5YR 7/6) loamy fine sand; structureless; loose when moist, very loose when dry; roots common to a depth of about 72 inches; medium acid.

The color of the A horizon is dark gray, grayish brown, or brown. The color difference characteristic of a B horizon may be lacking in some profiles. In these, the the A_2 horizon is underlain by pale-brown, reddish-brown, or brownish-yellow loamy fine sand. The depth to material that is finer textured than loamy fine sand ranges from 40 to 100 inches or more. When the soil is dry, all of the colors are lighter; the Munsell color value is generally 1 unit higher.

This is not an extensive soil. Practically all of it is in woodland. (Capability unit VIIe-1; woodland suitability group 8.)

Independence Series

The soils of the Independence series are deep, very sandy, rapidly permeable, and somewhat excessively drained. The B horizon differs slightly from the A horizon in structure but not in texture. To a depth of 40 inches, there is no material of a texture finer than loamy fine sand.

The only area of Independence soil in Bossier Parish is southwest of Plain Dealing. It is on a nearly level bench and is associated with the Orangeburg and Eustis soils on the gently sloping to strongly sloping upland. The Independence soils formed from sediments washed chiefly from Lakeland, Eustis, Orangeburg, and Ruston soils.

The native vegetation was a woodland of pine and hardwoods. Nearly all of the acreage has been cultivated, but it is now in unimproved pasture or is idle.

Independence loamy fine sand, 0 to 1 percent slopes (In).—A typical profile in a moist, unimproved pasture:

A_p 0 to 6 inches, dark-brown (10YR 3/3) loamy fine sand; weak, medium and fine, crumb structure; very friable; medium acid; gradual, wavy boundary; 4 to 7 inches thick.

A_3 6 to 10 inches, dark-brown (7.5YR 4/4) loamy fine sand; weak, medium and fine, granular structure; very friable; medium acid; gradual, smooth boundary; 3 to 8 inches thick.

B_2 10 to 40 inches, yellowish-red (5YR 4/8) loamy fine sand; some bridging of sand grains with clay; weak, coarse, subangular blocky structure; very friable; slightly acid; gradual, smooth boundary; 26 to 32 inches thick.

B_3 40 to 55 inches, yellowish-red (5YR 4/8) loamy fine sand; very weak, coarse, subangular blocky structure; very friable; medium acid; gradual, irregular boundary; 12 to 15 inches thick.

C 55 to 65 inches +, yellowish-red (5YR 5/8) sandy loam; pockets of light reddish-brown (5YR 6/4) loamy fine sand; very friable to loose when moist, slightly hard when dry; single grain (structureless); medium acid.

The B_2 horizon is not distinctly different from the A horizon; in some places there is almost no difference. The color ranges from reddish brown to reddish yellow.

This soil is fairly well suited to special crops, such as watermelons and peanuts, and also to the more common crops, such as cotton and corn. The low moisture-holding capacity and low fertility make special management necessary. Bermudagrass and some winter legumes are fairly well suited. The soil is moderately productive of pines, but it is generally a problem to establish the trees because of the low moisture-holding capacity. (Capability unit IIIs–1; woodland suitability group 8.)

Iuka Series

The soils of the Iuka series are acid and moderately well drained. The surface layer is light grayish-brown to dark-gray sandy loam. It is underlain by light yellowish-brown to brown mottled sandy loam or silt loam. The slope range is 0 to 2 percent.

These soils formed in reworked Coastal Plain material recently deposited as natural levees on the flood plains. They are associated with the Ochlockonee soils on the higher parts of the natural levees and with the Mantachie and Bibb soils on the lower parts of the flood plain. They are not so well drained as the Ochlockonee soils, and they have more mottling. They have better drainage and less mottling than the Mantachie and Bibb soils.

These are good agricultural soils, but they occur in small areas that are often isolated by surrounding floods. Occasionally they are flooded for short periods. Most areas are used for pasture or woodland.

In Bossier Parish, the Iuka soils were not mapped separately because of their small area. They were mapped with the Ochlockonee soils because they are closely associated and have similar characteristics. A representative profile of an Iuka soil is given on page 37, under the description of Ochlockonee and Iuka sandy loams.

Kalmia Series

The soils of the Kalmia series are moderately well drained, acid, and moderately permeable. They have a grayish-brown, sandy surface layer underlain by a yellowish-brown or brownish-yellow, friable subsoil, the lower part of which is commonly mottled with various shades of red and brown.

These soils formed from old alluvium washed principally from acid soils of the Coastal Plain uplands. They are not extensive and are located chiefly in the northern part of the parish. They lie on terraces along Cypress Bayou and other small streams.

The Kalmia soils are associated chiefly with the Cahaba, Prentiss, Stough, and Myatt soils. They are less well drained and more yellowish than the Cahaba soils. They lack the fragipan that is typical of the Prentiss and Stough soils. They are better drained than the Stough soils and much better drained than the poorly drained Myatt soils.

The native vegetation was a mixture of hardwoods and loblolly pine. Most of these soils have been cleared and cultivated in the past, but only about a fourth of the acreage is cultivated now. Another fourth is in pasture. The rest is in woodland, principally of loblolly pine and sweetgum.

Kalmia very fine sandy loam, 0 to 1 percent slopes (Ka).—A typical profile in moist pine woodland:

A_1 0 to 4 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; weak, fine, crumb structure; very friable; numerous fine and medium roots; medium acid; clear, smooth boundary; 3 to 4 inches thick.

A_2 4 to 12 inches, light yellowish-brown (10YR 6/4) very fine sandy loam; weak, fine, granular structure; very friable; numerous roots; medium acid; clear, smooth boundary; 7 to 10 inches thick.

B_2 12 to 30 inches, brownish-yellow (10YR 6/6) sandy clay loam; moderate, medium and fine, subangular blocky structure; friable; a few pores lined with clay films; roots are common; strongly acid; clear, smooth boundary; 16 to 20 inches thick.

B_3 30 to 44 inches, brownish-yellow (10YR 6/6) sandy clay loam or sandy loam that has few to common mottles of yellowish red (5YR 5/8) and yellowish brown (10YR 5/8); a few yellowish-red soft concretions; a few roots; strongly acid.

C 44 to 50 inches +, variegated yellowish-brown (10YR 5/8), yellowish-red (5YR 5/8), and light-gray (10YR 7/2) sandy loam; massive; friable; very strongly acid.

Some profiles of this soil have little mottling to a depth of about 36 inches; others have faint mottling at a depth of about 24 inches. The B_2 horizon generally consists of loam, sandy loam, or sandy clay loam. It ranges in color from yellowish brown to brownish yellow. The content of organic matter is generally low. The natural fertility and the available moisture capacity are moderately low.

This soil occurs in small areas. It is fairly well suited to cultivated crops, but only a small percentage is cultivated at present. Most areas are in pasture or woodland. (Capability unit I–3; woodland suitability group 2.)

Kirvin Series

The soils of the Kirvin series are well drained, acid, and slowly permeable. Their brown or dark-brown sandy surface layer is underlain by a red or dark-red, friable subsoil of sandy clay or clay loam. Varying numbers of ironstone fragments and hard concretions are common in both the surface layer and the subsoil.

These soils formed chiefly from materials of the Cook Mountain formation. The materials were high in iron oxides. These soils lie on thoroughly dissected uplands, where the slope range is 1 to 30 percent. They are fairly extensive. There are large areas near Redland and smaller areas near Rocky Mount and Fillmore.

The Kirvin soils are associated principally with the Nacogdoches, Luverne, and Shubuta soils. Their drainage is a little better than that of the Shubuta soils. The surface layer is generally browner. The subsoil is more friable, less plastic, and darker red, and there is less mottling. The Kirvin soils are less permeable and less friable than the Nacogdoches soils, and they have a thinner solum. They have a weakly expressed A_2 horizon that is lacking in the Nacogdoches soils. The Kirvin soils do not have the sandy loam texture in the lower part of the subsoil nor the stratified underlying materials that are characteristic of the Luverne soils.

The native vegetation was a mixture of upland hardwoods and shortleaf pine. Most of the larger areas on slopes of 10 percent or less have been cleared for cultivation. Much of the cleared acreage has returned to woodland, and only a few small areas are now cultivated. About 15 percent of the acreage is in pasture, and the rest is wooded. In a number of locations, several acres have been strip mined for iron ore gravel. They support only a scant cover of weeds and scattered small pines.

Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded (Kw).—A typical profile in a moist area now wooded but formerly cultivated:

A_p 0 to 4 inches, dark-brown (7.5YR 3/2) gravelly fine sandy loam; weak, fine, crumb structure; very friable; about 30 percent of volume consists of rounded to angular fragments of ironstone ¼ to 2 inches in diameter; abundant roots; medium acid; abrupt, smooth boundary; 3 to 5 inches thick.

B_1 4 to 10 inches, yellowish-red (5YR 4/6) loam; weak, medium, granular structure and fine, subangular blocky structure; very friable; about 15 percent consists of fragments of ironstone; abundant roots; strongly acid; clear, smooth boundary; 5 to 7 inches thick.

B_{21} 10 to 23 inches, dark-red (2.5YR 3/6) clay loam; compound structure of weak, medium and coarse, subangular blocky structure, breaking down into moderate, fine, granular and subangular blocky; thin, complete clay films on blocks and grains; firm in place, friable when detached; about 10 percent consists of ironstone fragments less than 1 inch in diameter; roots plentiful; strongly acid; gradual, smooth boundary; 11 to 15 inches thick.

B_{22} 23 to 33 inches, dark-red (2.5YR 3/6) clay loam; weak, medium, subangular blocky structure; thin, complete clay films on blocks; friable when moist, hard when dry; about 5 percent consists of ironstone fragments less than 1 inch in diameter; roots plentiful; strongly acid; clear, wavy boundary; 8 to 12 inches thick.

B_3 33 to 48 inches, dark-red (2.5YR 3/8) loam; a few spots of yellowish brown (10YR 5/6) that appear to be disintegrated concretions; a few thin, discontinuous streaks of light-gray clay; friable when moist, hard when dry; one or more ironstone plates about ¼ inch thick; few roots; strongly acid; gradual, wavy boundary; 12 to 16 inches thick.

C 48 to 57 inches +, dark reddish-brown (5YR 3/4) loam; partly disintegrated ironstone rock makes up about 30 to 40 percent of the volume; exterior surface of rock fragments is yellowish brown and soft, interior is reddish brown and hard; a few tree roots and flakes of mica; strongly acid.

The depth of the A horizon ranges from 3 to 8 inches. The B_2 horizons range in color from yellowish red (5YR 4/8) to dark red (2.5YR 3/6) and in texture from sandy clay to clay loam. Hard concretions and fragments of ironstone rock make up about 30 to 50 percent of the material in the A horizon. In most places the proportion of concretions and fragments decreases in the B horizon and increases in the C horizon. The depth to the C horizon is about 30 to 55 inches.

Small areas of Kirvin fine sandy loam, Shubuta fine sandy loam, and Nacogdoches fine sandy loam are included.

This is a fairly extensive soil. It is fairly well suited to the common cultivated crops and to most pasture plants, as well as to pines. Most areas have been cultivated in the past, but only a few small areas are now cultivated. About 10 percent of the soil is used for pasture, but most of it is wooded. (Capability unit IIIe–4; woodland suitability group 9.)

Kirvin gravelly fine sandy loam, 1 to 5 percent slopes (Kv).—Most areas of this soil have never been cleared and are, therefore, not eroded. The A horizon generally ranges from 8 to 12 inches in depth. The profile contains a weakly developed A_2 horizon of light brown to brown gravelly fine sandy loam, 2 to 5 inches in thickness. It is otherwise very similar to the profile of Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded (fig. 7).

This is a very inextensive soil. Practically all of it is wooded. (Capability unit IIIe–4; woodland suitability group 9.)

Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded (Kx).—The profile of this soil is very similar to that of Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded. The stronger slopes result in more rapid runoff and a moderately severe erosion hazard. This inextensive soil is associated with other Kirvin soils and with Shubuta, Luverne, and Nacogdoches soils.

This soil is not well suited to growing clean-tilled crops, except at long intervals in rotation with sod crops or close-growing broadcast crops. It is better suited to pasture, hay, or woods. A few acres are cultivated, about 30 percent is in pasture, and the rest is in woodland. (Capability unit IVe–1; woodland suitability group 9.)

Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded (Ky).—The horizons in this soil are somewhat thinner than those in Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded, but the profiles are otherwise very similar. In many places where the slope is more than 20 percent, the thickness of the A and B horizons together is only 24 to 36 inches.

This soil is not suitable for cultivated crops, because of the hazard of erosion. Its suitability for pasture is limited. Probably the best use for most of it is woodland, and nearly all of it is now in woodland. A few areas have been strip mined for ironstone gravel. (Capability unit VIe–1; woodland suitability group 9.)

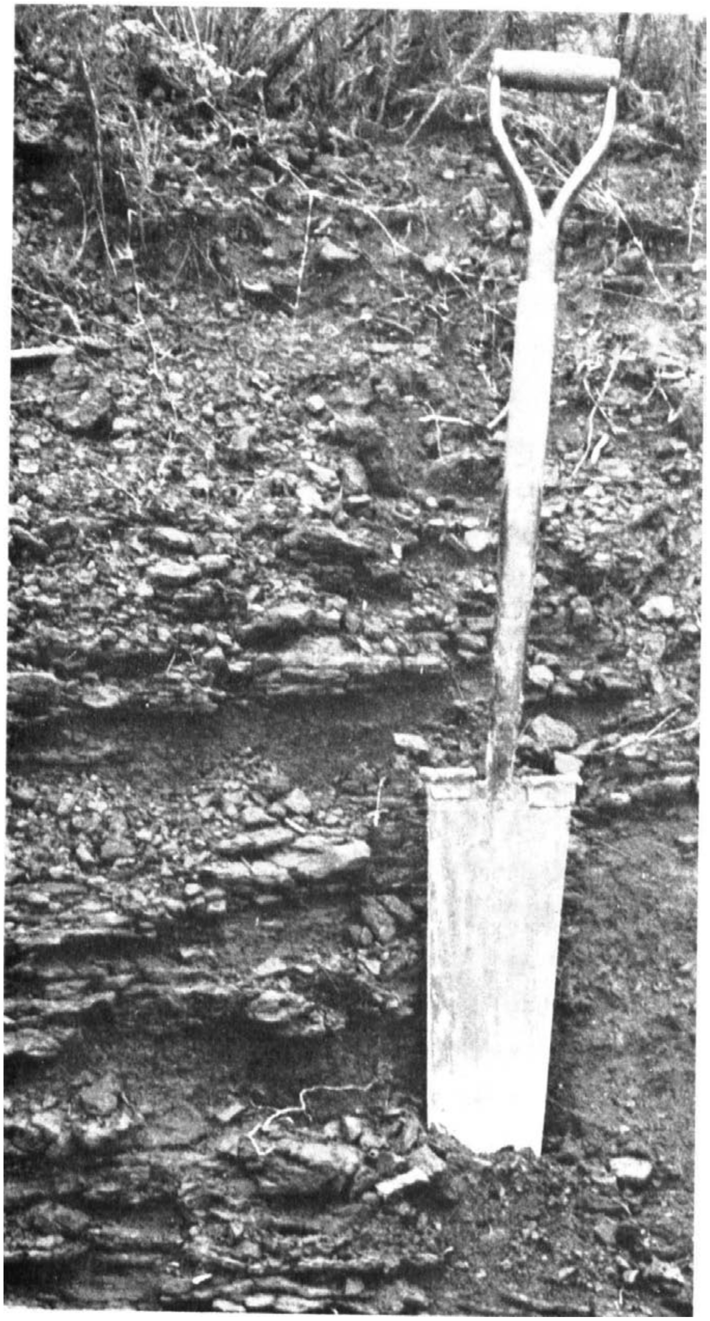

Figure 7.—Profile of Kirvin gravelly fine sandy loam, showing ironstone gravel.

Kirvin fine sandy loam, 1 to 5 percent slopes, eroded (Kr).—This soil does not contain appreciable amounts of ironstone gravel, but its profile is otherwise very similar to that of Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded. It is suited to the same crops, and yields are about the same. (Capability unit IIIe-4; woodland suitability group 5.)

Kirvin fine sandy loam, 5 to 8 percent slopes, eroded (Ks).—This soil has a profile similar to that of Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded, except that it does not contain as much ironstone. It is not well suited to continuous cultivation. It is fairly well suited to small grain and to the common pasture crops. (Capability unit IVe-1; woodland suitability group 5.)

Kirvin fine sandy loam, 8 to 30 percent slopes (Kt).—This soil is similar to Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded, except for stronger slopes, much smaller amounts of ironstone gravel, and lack of erosion.

This soil is not suited to cultivated crops, because of the severe hazard of erosion. It is fairly well suited to pasture, especially where the slopes are less than 20 percent. (Capability unit VIe-1; woodland suitability group 5.)

Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded (Ku).—The profile of this soil is similar to that of Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded, except that it contains only small amounts of ironstone gravel. Numerous large gullies have been cut by erosion on these stronger slopes.

Nearly all of this soil is in woodland. It is not suited to cultivated crops or pasture. It is fairly well suited to loblolly pine and shortleaf pine. (Capability unit VIIe-1; woodland suitability group 5.)

Lakeland Series

The soils of the Lakeland series are excessively drained and sandy. They consist of brownish-yellow loamy fine sand to a depth of 50 inches or more. In most places this is underlain by mottled red, yellowish-brown, and gray sandy clay or sandy clay loam.

The Lakeland soils formed in thick beds of coarse-textured Coastal Plain material. The slope range is 1 to 20 percent. These soils are not very extensive or widely distributed in this parish. The largest areas are west and southwest of Plain Dealing.

The Lakeland soils are commonly associated with the Eustis, Vaucluse, and Luverne soils. The Eustis soils are yellowish red at a depth of about 20 to 30 inches, while the Lakeland soils are brownish yellow to a depth of more than 50 inches. The Lakeland soils have a much thicker layer of loamy fine sand over the clayey material than the Vaucluse soils have. The Lakeland soils have no red or dark-red, clayey B horizon like that of the Luverne soils.

The native vegetation on the Lakeland soils consists of hickory, blackjack oak, red oak, shortleaf pine, and loblolly pine. Because of very low fertility and very low moisture-supplying capacity, these soils are poorly suited to most crops and pasture plants. A few small areas are cultivated occasionally for home gardens. Most of the acreage is wooded.

In Bossier Parish, the Lakeland soils were mapped in the same units as the Eustis soils because the two series are similar in the characteristics that affect their management. Each area consists of Lakeland soil or Eustis soil or a mixture of both. The Lakeland soils are far more extensive than the Eustis soils.

Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes (Lc).—This mapping unit consists of excessively drained, sandy soils that are medium acid to strongly acid and very low in fertility. The Lakeland soil is brownish-yellow loamy fine sand to a depth of more than 50 inches. The Eustis soil has 20 to 30 inches of loamy fine sand over yellowish-red loamy fine sand that extends to a depth of several feet.

Some areas of this unit consist only of Lakeland soil, some only of Eustis soil, and some of a mixture of both.

A typical profile of Lakeland loamy fine sand in moist, cutover woodland:

A_{00} 2 inches to ½ inch, organic litter that consists of pine straw and oak leaves.

A_0 ½ inch to 0, partly decayed, dark-gray leaf litter.

A_{11} 0 to 5 inches, dark grayish-brown (10YR 4/2) loamy fine sand; single grain (structureless); many bleached sand grains; loose when moist, very loose when dry, not sticky when wet; numerous roots; strongly acid; clear, smooth boundary; 4 to 6 inches thick.

A_{12} 5 to 14 inches, brownish-yellow (10YR 6/6) loamy fine sand; single grain (structureless); loose when moist, very loose when dry; numerous roots; medium acid; gradual, smooth boundary; 8 to 12 inches thick.

C_1 14 to 50 inches, brownish-yellow (10YR 6/6) loamy fine sand; single grain (structureless); loose when moist, very loose when dry; roots common; medium acid; diffuse, irregular boundary; 30 or more inches thick.

C_2 50 to 60 inches +, fine sand, predominantly very pale brown (10YR 7/3); numerous strata and streaks of strong brown (7.5YR 5/8); single grain (structureless); loose; strongly acid.

In most places the thickness of materials coarser than sandy loam ranges from 48 to 80 inches, but in a few places the thickness is as little as 40 inches or more than 10 feet.

The color of the A_1 horizon in this Lakeland soil ranges from very dark grayish brown in native woodland to pale brown in old cultivated fields. In woodland, the A_1 horizon commonly has a weak crumb structure. The reaction ranges from medium acid to very strongly acid.

The color of the A_{12} and the C horizons ranges from light gray to light yellowish brown or pale brown. The parent material is chiefly loamy fine sand, but in some places it is fine sand. The underlying D horizon varies considerably. It is most commonly a mottled red, yellowish-brown, and gray sandy clay or sandy clay loam.

A typical profile of Eustis loamy fine sand in moist, cutover woodland:

A_1 0 to 3 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, medium, crumb structure; very friable; numerous fine and medium roots; slightly acid; clear, smooth boundary; 2 to 3½ inches thick.

A_{21} 3 to 7 inches, brown (10YR 5/3) loamy fine sand in which pockets, filled root channels, and worm casts are dark grayish brown (10YR 4/2); very weak, medium, crumb structure; very friable when moist, nearly loose when dry; strongly acid; clear, smooth boundary; 3 to 5 inches thick.

A_{22} 7 to 14 inches, brown (10YR 5/3) loamy fine sand; very weak, medium, crumb structure; very friable when moist, nearly loose when dry; strongly acid; gradual, smooth boundary; 5 to 8 inches thick.

A_3 14 to 24 inches, brown (7.5YR 5/4) loamy fine sand; very weak, coarse, subangular blocky structure; very friable; strongly acid; clear, smooth boundary.

B 24 to 42 inches, yellowish-red (5YR 5/6) loamy fine sand that has a few small pockets of light brown (7.5YR 6/4); weak, medium, subangular blocky structure; very friable; strongly acid; gradual, smooth boundary; 14 to 20 inches thick.

C 42 to 60 inches, yellowish-red (5YR 5/6) and light-brown (7.5YR 6/4) loamy fine sand, distributed in irregularly shaped pockets; single grain (structureless) to very weak, crumb structure; very friable to loose; very strongly acid.

The A horizon in this Eustis soil is generally 20 to 30 inches thick. In a few places the material to a depth of 40 inches is light-brown to pale-brown loamy fine sand. In such areas the soil is a gradation between the Eustis series and the Lakeland series.

Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes, is the most extensive of the mapping units that contain these two series. In most places it occupies rather short slopes near small streams. Some small areas that have been cultivated have lost a considerable amount of soil through erosion, and their surface is irregular and gullied.

The soils in this mapping unit are too droughty and too susceptible to gullying to be suitable for cultivated crops. They are very poorly suited to pasture. Practically all of the acreage is in woodland. (Capability unit VIIe-1; woodland suitability group 8.)

Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes (La).—This mapping unit is better suited to cultivation than Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes, principally because of its gentler slopes. The two units have generally similar profiles.

About half of this inextensive soil has been cultivated, but only a few acres is now used for home gardens. Very low fertility and very low moisture-holding capacity limit the choice of cultivated crops or pasture plants. Productivity is also limited. These soils may be fairly well suited to certain deep-rooted grasses, such as Pensacola bahiagrass and Coastal bermudagrass. They are moderately productive of pine, but the problem of regeneration of the tree stand is rather severe because of the droughtiness of the soils. (Capability unit IIIs-1; woodland suitability group 8.)

Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes (Lb).—This mapping unit consists of the hilly areas between the smoother, higher lying divides and the slopes into streams. The soils are very similar to those in Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes, with which this unit is chiefly associated.

These soils are poorly suited or very poorly suited to most of the commonly grown cultivated crops and pasture plants. They are fairly well suited to a few deep-rooted grasses, such as Pensacola bahiagrass or Coastal bermudagrass. Nearly all of this mapping unit is in cutover woodland. The problem of regeneration of pine, especially loblolly pine, is rather severe. (Capability unit IVe-2; woodland suitability group 8.)

Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded (Ld).—The soils in this unit are like those in Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes, but they are cut by numerous deep gullies. This is a very inextensive soil. It is not suited to cultivation. Woodland is the best use for it. At present all of it is wooded or idle. (Capability unit VIIe-1; woodland suitability group 8.)

Luverne Series

The soils of the Luverne series are reddish, well drained, slightly acid to very strongly acid, and moderately permeable. The brown to grayish-brown sandy surface soil is underlain by a conspicuous red or dark-red sandy clay subsoil. The parent material is generally red, very friable sandy loam.

These soils formed on uplands from stratified sand, sandy loam, and sandy clay loam of Coastal Plain origin. The slope range is 1 to about 20 percent. These soils are fairly extensive and widely distributed on the uplands in this parish.

The Luverne soils are associated chiefly with the Shubuta, Kirvin, Orangeburg, and Ruston soils. They are coarser textured and more permeable than the Shubuta and Kirvin soils, especially in the lower part of the subsoil and in the substratum. They are redder than the Ruston soils, and the upper part of their subsoil is finer textured and less permeable. Their subsoil is thicker, somewhat finer textured, and more conspicuous than that of the Orangeburg soils.

The native vegetation was a forest of pines and hardwoods, in which the pines were probably dominant. Most of the gently sloping to moderately sloping areas were formerly cultivated. They were considered good soils for the common cultivated crops. Only a small percentage is now cultivated. Most areas are used for pasture or have returned to pine woodland through natural reseeding or planting.

Luverne fine sandy loam, 1 to 5 percent slopes, eroded (Lf).—A typical profile of a moist soil:

A_p	0 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium and fine, granular structure; very friable; medium acid; clear, smooth boundary; 6 to 9 inches thick.
B_1	8 to 12 inches, yellowish-red (5YR 4/6) sandy clay loam; weak, medium, subangular blocky structure; friable; strongly acid; gradual, smooth boundary; 3 to 6 inches thick.
B_{21}	12 to 20 inches, dark-red (2.5YR 3/6) sandy clay; moderate, medium, subangular blocky structure; prominent, dark-red clay films; firm when moist, hard when dry; very strongly acid; clear, smooth boundary; 6 to 10 inches thick.
B_{22}	20 to 26 inches, dark-red (2.5YR 3/6) sandy clay; moderate, medium, subangular blocky structure; thin, patchy clay films; friable when moist, slightly hard when dry; very strongly acid; gradual, wavy boundary; 12 to 18 inches thick.
B_3	26 to 44 inches, red (2.5YR 4/8) sandy clay loam; very weak, medium, subangular blocky structure; friable when moist, slightly hard when dry; very strongly acid; gradual, wavy boundary; 16 to 20 inches thick.
C	44 to 50 inches +, red (2.5YR 4/8) sandy loam that has reticulate mottles of strong brown (7.5YR 5/6) and light gray (10YR 7/2); friable when moist, hard when dry; massive (structureless) to very weak, coarse, subangular blocky structure; very strongly acid.

In a few areas, the A and B horizons contain a few hard, reddish-brown concretions and fragments of ironstone. In some places the C horizon consists of red fine sandy loam that is not mottled. The A_1 or A_p horizon is dark brown in a few areas. In a few places the B_1 horizon is very thin or absent. A few areas are not eroded. Small areas of Luverne gravelly fine sandy loam and small areas of Kirvin soils are included.

About 10 percent of this soil is cultivated, 25 percent is in pasture, and 65 percent is in woodland. It is moderately well suited to cotton, corn, oats, and most grasses and legumes that require a moderate fertility level. (Capability unit IIIe-4; woodland suitability group 5.)

Luverne fine sandy loam, 5 to 8 percent slopes, eroded (Lg).—This soil has a profile like that of Luverne fine sandy loam, 1 to 5 percent slopes, eroded. It is moderately extensive.

Most of this soil has been cultivated in the past but it is not cultivated now. About 25 percent is used for pasture, 15 percent is idle, and 60 percent is wooded. This soil can be cultivated occasionally or plowed for pasture renovation. It should not be cultivated to clean-tilled crops more frequently than 1 year in 4 or 5 years. It is fairly well suited to pasture. (Capability unit IVe-1; woodland suitability group 5.)

Luverne fine sandy loam, 8 to 20 percent slopes, eroded (Lh).—The profile of this soil is like that of Luverne fine sandy loam, 1 to 5 percent slopes, eroded. This is an inextensive soil.

This soil is not suited to cultivation. It is moderately well suited to permanent pasture, particularly the less sloping parts. Pasture renovation should be done carefully. Plowing should be across the slope or approximately on the contour. (Capability unit VIe-1; woodland suitability group 5.)

Luverne gravelly fine sandy loam, 1 to 5 percent slopes (Lk).—The surface layer of this soil is thicker than that of Luverne fine sandy loam, 1 to 5 percent slopes, eroded. About 15 to 30 percent of the volume of this soil consists of ironstone gravel. The percentage of gravel is greatest in the surface layer and decreases with depth.

This is an inextensive soil. In suitability for crops and in yields, it is similar to Luverne fine sandy loam, 1 to 5 percent slopes, eroded. It is a little more resistant to erosion, and its moisture-holding capacity is somewhat lower. (Capability unit IIIe-4; woodland suitability group 9.)

Luverne gravelly fine sandy loam, 5 to 8 percent slopes (Lm).—The surface layer is thicker and the content of gravel is greater in this soil than in Luverne fine sandy loam, 1 to 5 percent slopes, eroded, but in other respects the profiles are similar.

This soil is not suited to continuous cultivation, because of the moderately severe hazard of erosion. It can be cultivated occasionally. It can be plowed for pasture renovation if cover is carefully maintained during the seasons when rainfall is highest. This soil is fairly well suited to broadcast crops and to pasture. (Capability unit IVe-1; woodland suitability group 9.)

Luverne loamy fine sand, thick surface, 1 to 5 percent slopes (Ln).—This soil has a profile similar to that of Luverne fine sandy loam, 1 to 5 percent slopes, eroded, except that it has a thicker, slightly coarser textured surface layer. The thickness of the surface layer ranges from 12 to 30 inches; in most areas it is about 24 inches. The moisture-holding capacity and the fertility are lower than those of the Luverne fine sandy loams but the permeability is more rapid. Yields of most crops are slightly less. This soil is not so well suited to pasture. (Capability unit IIIe-4; woodland suitability group 5.)

Luverne loamy fine sand, thick surface, 5 to 8 percent slopes (Lo).—This soil differs from Luverne loamy fine sand, thick surface, 1 to 5 percent slopes, principally in its stronger slopes. It is inextensive, and nearly all of it is in woodland. (Capability unit IIIe-4; woodland suitability group 5.)

Luverne soils, 1 to 20 percent slopes, severely eroded (Lp).—This mapping unit consists of Luverne soils that have lost all or most of their surface layer through erosion. Closely spaced gullies penetrate into the sandy and easily eroded B and C horizons. The subsoil is exposed over more than half of the acreage.

There are only a few acres of this unit. The soils are idle or are in woodland. (Capability unit VIIe-1; woodland suitability group 9.)

Mantachie Series

The soils of the Mantachie series are somewhat poorly drained, and most of them are frequently flooded. They are slightly acid to very strongly acid. The brown, grayish-brown, or yellowish-brown, sandy or silty surface layer is underlain by medium textured to moderately fine textured alluvium that is mottled gray, brown, and yellow.

These soils are moderately extensive and widely distributed. They occur mostly along the smaller streams. They formed in alluvium derived chiefly from nearby uplands.

The Mantachie soils are associated principally with soils of the Bibb, Ochlockonee, and Iuka series and with Mixed wet alluvial land. In some places they are associated with Myatt and Stough soils. They are better drained and less uniformly gray than the Bibb soils. They are less well drained and more mottled than the Ochlockonee and Iuka soils. They generally occupy somewhat lower positions than the Myatt and Stough soils.

Most of the native vegetation was hardwoods, including willow oak, red oak, white oak, gum, and hickory. There was a little loblolly pine. These soils are now used chiefly for woodland.

Mantachie very fine sandy loam (Ma).—This is the only Mantachie soil mapped in the parish. The slope is less than 1 percent. A typical profile in a moist, wooded area:

A_{11} 0 to 6 inches, dark yellowish-brown (10YR 3/4) very fine sandy loam; weak to moderate, fine, granular structure; friable when moist, slightly sticky when wet; abundant tree roots; medium acid; clear, smooth boundary; 4 to 7 inches thick.

A_{12} 6 to 10 inches, dark yellowish-brown (10YR 3/4) very fine sandy loam or silt loam; common, faint, small mottles of dark grayish brown (10YR 4/2); weak, fine, granular structure; friable when moist, slightly sticky when wet; abundant medium and fine tree roots; strongly acid; clear, wavy boundary; 5 to 8 inches thick.

C_{1g} 10 to 24 inches, pale-brown (10YR 6/3) silt loam; many, faint, small to medium mottles of gray (10YR 6/1); massive; friable when moist, slightly hard when dry; dark-brown stains around old root channels; many soft and a few hard, small, brown concretions that have a black interior; few roots; strongly acid; gradual, smooth boundary; 10 to 15 inches thick.

C_{2g} 24 to 36 inches, light brownish-gray (10YR 6/2) silt loam; common, small and medium, distinct mottles of brownish yellow (10YR 6/6); massive; friable when moist, hard when dry; many medium and small, dark-brown concretions that have a black interior; numerous tubular pores; few roots; very strongly acid; abrupt, wavy boundary; 12 to 16 inches thick.

B_{bg} 36 to 44 inches, gray (10YR 6/1) silty clay prominently mottled with strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6); moderate to strong, medium, subangular blocky structure; cracks filled with light-gray silt; a few patchy clay films; very firm when moist, very hard when dry; very strongly acid; 6 to 10 inches thick.

C_{bg} 44 to 60 inches +, variegated gray, yellowish-brown (10YR), and reddish-yellow (7.5YR) sandy clay loam; strata and pockets of sandy loam and silt loam; massive; friable; very strongly acid.

The depth of recent alluvial material over the buried older soil generally ranges from 2 to about 4½ feet. The depth to gray mottles is generally 7 to 12 inches. In some places the silty clay B_{bg} layer is absent or very thin. Some profiles contain only a few concretions.

This soil may be flooded at any time of the year, but floods are most likely in winter and early in spring. The floods range from those a few inches deep that last for 3 or 4 hours to those 3 feet or more deep that last for 24 hours or longer.

This soil is not suited to cultivation, because the frequent floods damage crops. It is fairly well suited to warm-season pasture grasses and some legumes. About 10 percent is used for pasture, and the rest is wooded. (Capability unit Vw-1; woodland suitability group 1.)

McKamie Series

The soils of the McKamie series are well drained, slightly acid to very strongly acid, and very slowly permeable. The surface layer is grayish brown and sandy. It rests abruptly on a layer of red plastic clay. Stratified clay loam, sandy loam, and clay lie beneath the clay.

These soils formed from old alluvium, of which the major part was derived from red beds. They are fairly extensive and widely distributed on the broad stream terraces in the eastern, central, and southern parts of the parish.

The McKamie soils are associated principally with the Gore, Hortman, and Morse soils. They are underlain by lighter textured material than that beneath the associated soils. They are better drained than the Gore and Hortman soils, and they lack distinct mottles in the subsoil. The McKamie soils are acid to a depth of at least 30 inches, but the Morse soils in most places are moderately alkaline throughout.

The native vegetation on these soils was a forest of hardwoods and pines. Many of the gently sloping to moderately sloping areas have been cleared and were formerly cultivated. Only a few areas are cultivated at present. Most of the acreage is in forest or pasture.

McKamie very fine sandy loam, 5 to 8 percent slopes, eroded (Md).—A typical profile in a moist area now wooded but formerly cultivated:

A_p 0 to 3 inches, dark-brown (10YR 4/3) very fine sandy loam; weak, medium and fine, granular structure; very friable when moist, neither plastic nor sticky when wet; many roots; slightly acid; clear, smooth boundary; 2 to 4 inches thick.

A_3 3 to 5 inches, brown (7.5YR 5/4) very fine sandy loam; weak, fine, crumb structure; very friable when moist, neither plastic nor sticky when wet; many roots; medium acid; abrupt, smooth boundary; 2 to 3 inches thick.

B_{21} 5 to 13 inches, red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; patchy to almost continuous clay films on vertical structural faces and mostly patchy films on horizontal faces; very firm when moist, very plastic when wet, very hard when dry; roots common; very strongly acid; gradual, smooth boundary; 6 to 12 inches thick.

B_{22} 13 to 36 inches, red (2.5YR 4/6) clay that has a few, fine, faint mottles of yellowish red (5YR 5/6); moderate, medium, subangular blocky structure; patchy clay films; very firm when moist, very plastic when wet, very hard when dry; very strongly acid; clear, wavy boundary; 20 to 30 inches thick.

D_{1u} 36 to 42 inches, red (2.5YR 4/8) silty clay loam; moderate, medium to coarse, angular blocky structure; structural faces coated with pale-brown to yellowish-brown silt; a few small pockets of red clay; firm when moist, slightly plastic when wet, slightly hard when dry; very strongly acid; gradual, smooth boundary; 6 to 12 inches thick.

D_2 42 to 50 inches +, red, stratified sandy loam, silt loam, and silty clay loam that have streaks and pockets of very pale brown; medium acid.

A few acres of this soil in undisturbed woodland have a grayish-brown or pale-brown A_2 horizon 6 to 10 inches thick. In many places the B horizons are dark red

(2.5YR 3/6). The depth to the coarser textured D layers ranges from about 36 to 50 inches. In some places, where the depth to the D layers is greatest, the layer just above is mildly calcareous and contains a few small concretions of calcium carbonate.

This is a fairly extensive soil. It is not suited to cultivated crops, because rapid runoff makes erosion very difficult to control. It is fairly well suited to permanent pasture. Most of it has been cultivated in the past, but now it is idle, in pasture, or in woodland. (Capability unit VIe–2; woodland suitability group 6.)

McKamie very fine sandy loam, 1 to 5 percent slopes, eroded (Mc).—The profile of this soil is similar to that of McKamie very fine sandy loam, 5 to 8 percent slopes, eroded. This is a fairly extensive soil. It is moderately well suited to cultivated crops, small grain, hay, and pasture. (Capability unit IIIe–6; woodland suitability group 6.)

McKamie very fine sandy loam, 1 to 5 percent slopes (Mb).—The surface layer of this soil is thicker than that of McKamie very fine sandy loam, 5 to 8 percent slopes, eroded.

Yields of cultivated crops are generally a little higher on this soil than on the eroded soil of the same slope. Intensive measures to control erosion are needed when cultivated crops are grown. (Capability unit IIIe–6; woodland suitability group 6.)

McKamie and Hortman soils, 8 to 20 percent slopes (Me).—Individual areas of this mapping unit consist of McKamie soils or Hortman soils or soils of both series. They are mapped together because they are similar in the characteristics that are important to use and management. All of them are very slowly permeable soils that have rapid runoff. The Hortman soils are not so well drained as the McKamie soils, and the lower part of their subsoil is prominently mottled. A typical McKamie soil is described on page 31. A typical Hortman soil is described on page 25.

None of this unit is suited to cultivated crops. The less sloping areas are moderately well suited to permanent pasture, if well managed. Probably the best use for these soils is woodland. Most areas are now in woodland or pasture. (Capability unit VIIe–2; woodland suitability group 6.)

Miller Series

The soils of the Miller series are moderately well drained to somewhat poorly drained, very slowly permeable, slightly alkaline to moderately alkaline, and calcareous. The texture of the reddish-brown surface layer ranges from silt loam to clay. The subsurface layers are dominantly reddish-brown clay or silty clay. In areas where the surface soil has a fine texture, wide cracks are common during dry weather. The soil begins to shrink when its moisture content is slightly less than field capacity. Many undisturbed areas have a weak gilgai microrelief.

These soils are extensive on the bottom lands of the Red River. They formed from recent alluvial sediments derived chiefly from red beds and deposited by the Red River.

The Miller soils are associated with the Roebuck, Buxin, and Yahola soils. They are better drained than the Roebuck soils and do not have the mottled subsurface layers characteristic of the Roebuck soils. They are better drained and more uniformly colored than the Buxin soils and do not have the gray layers typical of Buxin soils. The Miller soils are less permeable and finer textured than the Yahola soils.

The native vegetation on these soils was bottom-land hardwoods. Nuttall oak, Shumard oak, water oak, overcup oak, pecan, hackberry, elm, and cypress were the principal trees. Most of the areas that are not likely to be flooded are used for crops or pasture. Some cutover woodland is left.

Miller clay, 0 to 1 percent slopes (Mg).—A typical profile in a moist, cultivated field:

A_p 0 to 7 inches, dark reddish-bown (5YR 3/4) clay; strong, fine, blocky structure and medium, granular structure; friable when moist, very sticky and plastic when wet, very hard and crumbly when dry; moderately alkaline and calcareous; abrupt, smooth boundary; 5 to 8 inches thick.

AC 7 to 18 inches, reddish-brown (2.5YR 4/4) clay containing pockets of dark reddish brown (5YR 3/4) that seem to be filled cracks; strong, medium and fine, angular blocky structure; very firm when moist, very sticky and plastic when wet; moderately alkaline and calcareous; clear, irregular boundary; 9 to 13 inches thick.

C 18 to 44 inches +, reddish-brown (2.5YR 4/4) clay; moderate, fine, angular blocky structure; very firm when moist, very sticky and plastic when wet; a few small concretions of calcium carbonate in the lower part; moderately alkaline and calcareous.

The colors of the various layers range from dusky red (10R 3/4) to red (2.5YR 4/6) or reddish brown (5YR). In a few areas there are spots and pockets of dark gray at a depth of more than 30 inches. In a few places the A_p layer consists of silty clay. The AC layer ranges from 6 to 20 inches in thickness.

The reaction in the surface layer ranges from slightly alkaline to moderately alkaline. Nearly everywhere, the subsurface layers are moderately alkaline.

About 50 percent of the acreage of this soil is cultivated, chiefly to cotton. About 40 percent is used for pasture or hay, and 10 percent is in cutover woodland. This soil is well suited to alfalfa and fairly well suited to cotton if adequate surface drainage is provided. It is well suited to whiteclover, southern wild winter peas, dallisgrass, and Coastal bermudagrass. The chief problems are a surface texture unfavorable for cultivation and the intensive need for surface drainage. (Capability unit IIIw–1; not suited to pines but can be used to grow hardwoods.)

Miller clay, 1 to 3 percent slopes (Mh).—The profile of this soil is like that of Miller clay, 0 to 1 percent slopes. The soil is located near old channels, and its slopes are commonly short. It is fairly extensive, but the separate areas are generally small.

This soil is suited to about the same crops as Miller clay, 0 to 1 percent slopes, but it has a slight to moderate hazard of erosion rather than a drainage problem. A somewhat higher percentage is used for hay or pasture. (Capability unit IIIe–1; not suited to pines but can be used to grow hardwoods.)

Miller clay, 3 to 8 percent slopes (Mk).—This soil has a profile similar to that of Miller clay, 1 to 3 percent slopes. It is a very inextensive soil, used mostly for pasture and hay. These are probably its best uses. (Capability unit IIIe–1; not suited to pines but can be used to grow hardwoods.)

Miller clay, undulating (Mn).—This soil occupies a series of narrow winding ridges and depressions. It has uneven, complex slopes of 0 to 3 percent. The uneven surface is the principal difference between this soil and Miller clay, 0 to 1 percent slopes.

This soil is suited to about the same crops as Miller clay, 0 to 1 percent slopes, but yields are lower and adequate drainage is more difficult to provide. A larger percentage of this soil is used for hay or pasture. (Capability unit IIIw–2; not suited to pines but can be used to grow hardwoods.)

Miller clay, overflow, 0 to 1 percent slopes (Mm).—Crops on this soil are frequently damaged by floods, usually from backwater. In other respects, this soil is like Miller clay, 0 to 1 percent slopes. It is moderately extensive.

This soil is not suited to crops, and its suitability for pasture is limited. Most areas are in woodland. (Capability unit Vw–2; not suited to pines but can be used to grow hardwoods.)

Miller silt loam, 0 to 1 percent slopes (Mo).—This soil generally lies on the backslope of natural levees, in a somewhat higher position than Miller clay, 0 to 1 percent slopes. The A horizon is strong-brown to reddish-brown, friable silt loam and is 5 to 12 inches thick. The subsoil is reddish-brown clay or silty clay and has a strong blocky structure. This layer may contain a few strata of silty clay loam up to 3 inches in thickness. Other characteristics of this soil are like those of Miller clay, 0 to 1 percent slopes.

This soil is well suited to cultivated crops. Most of it is used for that purpose. (Capability unit I–1; not suited to pines but can be used to grow hardwoods.)

Miller silt loam, 1 to 3 percent slopes (Mp).—The surface layer of this soil is strong-brown to reddish-brown silt loam and is 5 to 12 inches thick in most places. Beneath this is a thick layer of reddish-brown clay or silty clay. In other respects the profile of this soil is generally like that of Miller clay, 0 to 1 percent slopes. Because of its stronger slopes, this soil has a slight hazard of erosion.

This soil is well suited to all the commonly grown crops. Most of it is cultivated. Drainage is not a problem, but the orderly collection and disposal of runoff are important. (Capability unit IIe–1; not suited to pines but can be used to grow hardwoods.)

Miller silty clay loam, 0 to 1 percent slopes (Mr).—This soil has a profile somewhat similar to that of Miller clay, 0 to 1 percent slopes, but the surface layer is coarser textured and less plastic. It is easier to work and more suitable for cultivation and is not in such serious need of drainage.

This soil is well suited to a considerable variety of cultivated crops, hay crops, and pasture plants. Most areas are cultivated or are in hay or pasture. (Capability unit IIw–1; not suited to pines but can be used to grow hardwoods.)

Mixed Alluvial Land

These miscellaneous land types formed in various kinds of recent alluvium. Most of their characteristics result directly from the effect of their topographic position on their parent material.

These alluvial land types show little differentiation between horizons. The Ruston, Luverne, Kirvin, and Orangeburg soils, with which these land types are chiefly associated on the uplands, have definite and strongly expressed differences between horizons. The Mantachie soils, with which these land types are associated on the flood plains, are poorly drained to somewhat poorly drained soils formed from recent alluvium, but they generally contain a buried soil that has more distinctly expressed horizons.

These alluvial land types are next to streams and are frequently flooded. They are cultivated very little, because of the hazard of crop damage during floods. Most areas are in pasture or woodland.

Mixed alluvial land (Ms).—This land type occupies small areas near the head of small intermittent drainageways in the uplands. The slope is less than 3 percent. The characteristics of the soil material vary, but the following profile, taken when the soil was moist, represents a considerable acreage:

A_p 0 to 6 inches, strong-brown (7.5YR 5/6) fine sandy loam; weak, fine, granular structure; very friable; medium acid; abrupt, slightly wavy boundary; 4 to 7 inches thick.

A_b 6 to 12 inches, light brownish-gray (10YR 6/2) very fine sandy loam that has a few small, yellowish-brown (10YR 5/6) mottles; friable; weak, fine, granular structure; strongly acid; clear, slightly wavy boundary; 5 to 7 inches thick.

C_1 12 to 18 inches, strong-brown (7.5YR 5/8) loamy fine sand that has a few large streaks and spots of brownish yellow (10YR 6/6); massive; very friable; a few small, dark-brown, hard concretions; strongly acid; gradual, smooth boundary; 4 to 8 inches thick.

C_2 18 to 40 inches, thinly stratified layers of fine sandy loam and loamy fine sand ranging in color from brownish yellow (10YR 6/6) to strong brown (7.5YR 5/6); compact; massive; very friable; strongly acid.

The texture ranges from loamy fine sand to silt loam or loam, but it is sandy in most places. The color ranges through strong brown, brown, yellowish brown, brownish yellow, and, in a few places, yellowish red. In some places, gray mottling is present at a depth of more than 24 inches. In most places this land type is moderately well drained, slightly acid to strongly acid, and moderately permeable.

These areas are rather frequently flooded, but the floods are commonly of short duration. Scouring and deposition are usually slight to moderate.

Most areas of this land type are in pasture or woodland. A few small areas are cultivated. (Capability unit IIw–5; woodland suitability group 1.)

Mixed wet alluvial land (Mt).—This land type formed from local alluvium on the flood plains of small intermittent streams. It is widely distributed on the uplands and larger stream terraces. Most slopes are less than 1 percent. The profile characteristics cover a rather wide range in texture and color, but the following profile, taken while the material was moist, represents a considerable acreage:

A_1 0 to 6 inches, light brownish-gray (10YR 6/2) fine sandy loam that has common, distinct mottles of light gray (10YR 7/1); dark-brown stains around grass roots; weak, medium, granular structure; friable; strongly acid.

C_{1g} 6 to 14 inches, light-gray (10YR 7/1) silt loam that has prominent mottles of yellowish brown (10YR 5/4); massive (structureless) to weak, medium, platy structure; friable when moist, hard when dry; many dark-brown to black, small, soft to medium hard concretions; very strongly acid; abrupt, wavy boundary.

C_2 14 to 40 inches, stratified layers of gray, brown, and brownish-yellow sandy loam, silt loam, and silty clay loam; soft, dark-brown concretions common; a few hard concretions; friable to firm; very strongly acid.

The profiles at different places vary considerably in arrangement and thickness of layers. In most places gray or light gray is the dominant color in all horizons, but thin layers or mottles of yellowish brown or strong brown are common. The surface layer ranges from fine sandy loam to silt loam, and the subsurface layers range from loamy fine sand to silty clay loam. Thin stratification is characteristic, especially in the deeper layers. The reaction ranges from medium acid to very strongly acid.

Most areas of this land type are poorly drained to somewhat poorly drained. They are frequently flooded. In most places they are subject to frequent deposition or scouring of material.

A few areas have been cleared and are used for pasture. Most areas are in woodland. Gum and oak are the principal trees, but some loblolly pine is generally present. (Capability unit Vw-1; woodland suitability group 4.)

Morse Series

The soils of the Morse series are well drained, reddish, fine textured, mildly alkaline to moderately alkaline, and calcareous. Their horizons are weakly expressed. Their permeability is very slow. The surface layer is dark reddish-brown to very dark grayish-brown clay. The layer beneath is dark-brown to dark-red, moderately alkaline, very plastic clay. Deep, wide cracks are characteristic of these soils in dry weather. In undisturbed areas on gentle slopes, a pronounced gilgai microrelief is common.

These soils are fairly extensive. They occur mostly on escarpments and slopes into streams that are entrenched in larger stream terraces. They formed from moderately alkaline, fine-textured, old alluvium that was derived chiefly from red beds.

The Morse soils are most commonly associated with the McKamie and Gore soils. They are finer textured and more alkaline than the McKamie soils, and their horizons are more weakly expressed. The Morse soils are alkaline and unmottled, but the Gore soils are acid and prominently mottled. The Morse soils have better drainage than the Gore soils.

The native vegetation consisted of bunchgrass, scattered clumps of hardwood trees, and thorny shrubs, such as hawthorn. Pine was generally lacking. These soils are now used mostly for unimproved pasture. Many areas are unfenced and are grazed by range cattle.

Morse clay, 5 to 8 percent slopes, eroded (Mv).—A typical profile in an idle area that was formerly cultivated:

A_p 0 to 4 inches, dark reddish-brown (5YR 3/4) clay; moderate, medium, granular structure and medium, angular blocky structure; friable when handled lightly, firm and plastic when pressed; a few small, rounded concretions of calcium carbonate; moderately alkaline; abrupt, smooth boundary; 3 to 5 inches thick.

AC 4 to 16 inches, red (2.5YR 4/6) heavy clay; cracks filled with dark reddish-brown (5YR 3/4) clay from the A_p horizon; strong, fine, angular blocky structure; very firm when moist, very plastic when wet, extremely hard when dry; many small, hard, rounded to subangular concretions of calcium carbonate; moderately alkaline; clear, slightly wavy boundary; 10 to 20 inches thick.

C 16 to 60 inches +, red (2.5YR 4/6) heavy clay; weak, medium, irregular blocky structure to massive (structureless) when moist; on exposure to repeated wetting and drying, breaks down to fine or very fine, angular blocky structure; very firm when moist, very sticky and plastic when wet, extremely hard when dry; many small concretions of calcium carbonate; moderately alkaline.

A few areas have a silty clay A_p horizon. In a few places, the C horizon is stratified with thin lenses of silt loam or sandy loam, generally at a depth of more than 50 inches.

The permeability of this soil is very slow. Runoff is rapid. The soil-moisture relationship is poor.

This is a fairly extensive soil. Most of it has been severely overgrazed by range cattle and hogs. Some areas have been cultivated, but this soil is not suited to cultivation. Its suitability for pasture is limited. Pines do not grow well, and seedling mortality is high. (Capability unit VIe-3; woodland suitability group 12.)

Morse clay, 1 to 5 percent slopes, eroded (Mu).—This soil has a profile similar to that of Morse clay, 5 to 8 percent slopes, eroded. It is poorly suited to the common cultivated crops. Probably its best use is pasture, even though it is not well suited to all forage plants. Most areas are now in unimproved pasture. This is a fairly inextensive soil. (Capability unit IIIe-7; woodland suitability group 12.)

Morse clay, 3 to 8 percent slopes, severely eroded (Mx).—This soil is like Morse clay, 5 to 8 percent slopes, eroded, except that it contains numerous large gullies. It is not suited to cultivated crops and is of very limited suitability for pasture. It is not suited to pine trees. (Capability unit VIIe-3; woodland suitability group 12.)

Morse clay, 8 to 20 percent slopes, eroded (Mw).—This is an inextensive soil. Runoff is very rapid.

This soil is not suited to cultivated crops. Its suitability for pasture is limited, and yields of forage are generally low. It is not well suited to pine trees. (Capability unit VIIe-3; woodland suitability group 12.)

Morse clay, dark surface, 1 to 5 percent slopes, eroded (Mz).—This fairly inextensive soil is associated with other Morse soils, but it is generally less sloping. In nearly all areas it has gilgai microrelief, which is commonly pronounced. Shallow gullies are common. The A horizon is thicker than that of the other Morse soils. In many places this soil is less alkaline. A typical profile in a moist area in grazed, open woodland:

A_{11} 0 to 4 inches, very dark grayish-brown (10YR 3/2) clay; moderate, fine, granular structure; friable when handled lightly, firm and slightly plastic when pressed; neutral; abundant fine roots; clear, smooth boundary; 3 to 5 inches thick.

A_{12} 4 to 10 inches, very dark grayish-brown (10YR 3/2) silty clay; moderate, medium, subangular blocky structure; firm; mildly alkaline; numerous roots; abrupt, smooth boundary; 4 to 7 inches thick.

AC 10 to 24 inches, dark-brown (10YR 3/3) clay; many small spots and pockets of reddish-brown (5YR 4/4) clay; moderate, fine, subangular blocky structure; slightly alkaline; very firm when moist, very plastic when wet; clear, irregular boundary; 10 to 16 inches thick.

C_1 24 to 36 inches, reddish-brown (5YR 4/4) clay; moderate, fine, subangular blocky structure; firm; moderately alkaline; many very fine calcareous concretions; clear, smooth boundary; 10 to 14 inches thick.

C_2 36 to 44 inches +, dark-red (2.5YR 3/6) clay; moderate, coarse, angular blocky structure; very firm when moist, very plastic when wet, extremely hard when dry; moderately alkaline; many very fine calcareous concretions.

The thickness of the dark-colored A horizons ranges from 6 to 12 inches. There is considerable variation within short distances. In a few included areas, the soil is slightly acid to a depth of about 12 inches.

This soil is probably better suited to most crops and pasture plants than Morse clay is. In most places it supports a more vigorous growth of trees, mostly post oak, elm, and hawthorn. (Capability unit IIIe-7; woodland suitability group 12.)

Morse clay, dark surface, 1 to 5 percent slopes (My).—This soil is like Morse clay, dark surface, 1 to 5 percent slopes, eroded, except that its surface layer is thicker and it does not have numerous shallow gullies. (Capability unit IIIe-7; woodland suitability group 12.)

Muskogee Series

The soils of the Muskogee series are moderately well drained, slightly acid to very strongly acid, and very slowly permeable. The grayish-brown silty surface layer is underlain by a yellowish-brown subsoil of silty clay loam to silty clay, the lower part of which is mottled with pale brown, gray, and red. The parent material is mottled reddish-yellow, red, and gray, plastic silty clay or clay. These soils formed on stream terraces from old alluvium that consisted chiefly of sediments from red beds. They are fairly extensive, but individual areas are generally small.

The Muskogee soils are associated with the Acadia, Wrightsville, and Prentiss soils. They are better drained than the Acadia soils and Wrightsville soils, and their mottling is at a greater depth. They lack the distinct fragipan that is characteristic of the Prentiss soils.

The native forest was a mixture of hardwoods and pines. Most areas have been cleared and cultivated in the past. At present about 50 percent is in pasture, 10 percent is cultivated or is idle, and 40 percent is in woodland.

Muskogee silt loam, 1 to 5 percent slopes (Mab).—A typical profile in moist, ungrazed woodland:

A_{00} 2 inches to 0, litter of undecomposed pine needles.

A_1 0 to 3 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, fine, granular structure; friable when moist, slightly sticky when wet; many fine and medium roots; medium acid; clear, smooth boundary; 2 to 4 inches thick.

A_2 3 to 10 inches, pale-brown (10YR 6/3) silt loam that has faint mottles of grayish brown (10YR 5/2); weak, medium, granular structure; friable; numerous fine and medium roots; strongly acid; clear, smooth boundary; 4 to 7 inches thick.

B_1 10 to 16 inches, yellowish-brown (10YR 5/6) silt loam or light silty clay loam; moderate, medium and fine, subangular blocky structure; friable; fine and medium roots common; very strongly acid; clear, smooth boundary; 5 to 9 inches thick.

B_2 16 to 28 inches, reddish-yellow (7.5YR 6/6) silty clay that has common, medium, distinct mottles of dark red (2.5YR 3/6) and gray (5Y 5/1); moderate, medium, angular blocky structure; dark-red clay films on most vertical faces; firm when moist, plastic when wet, hard when dry; medium-sized roots common; a few fine roots; small, black to dark-brown concretions common; very strongly acid.

C_1 28 to 40 inches, reddish-yellow (7.5YR 7/8) silty clay prominently mottled with 30 percent red (2.5YR 5/8) and 20 percent gray (5Y 6/1); moderate, medium, subangular blocky structure; strongly acid; gradual, smooth boundary; 10 to 16 inches thick.

C_2 40 to 50 inches, red (2.5YR 4/6) clay mottled with 20 to 30 percent light brownish gray (2.5Y 6/2); red increases with depth; very weak, medium and coarse, irregular blocky structure; very firm when moist, very plastic when wet, very hard when dry; strongly acid to medium acid.

Areas that have been cultivated have a grayish-brown A_p layer 7 to 10 inches thick. Some areas have a surface layer of very fine sandy loam. Most places have a few sandy mounds in which the A_2 and B_1 layers are thick. In other areas, a thin layer of light-gray silt loam lies just above the C_1 layer, and coatings of gray silt are common on the faces of the structural blocks in the C_1 layer.

This soil is fairly well suited to cultivated crops, hay, or pasture. About one-fourth of the acreage has been cleared and cultivated in the past. (Capability unit IIIe-5; woodland suitability group 6.)

Muskogee silt loam, 1 to 5 percent slopes, eroded (Mac).—The surface layer of this soil is thinner than that of Muskogee silt loam, 1 to 5 percent slopes. It is generally dark grayish brown to yellowish brown. In small areas the B horizon is exposed or has been mixed into the plowed layer. In these spots, the surface layer may be silty clay loam and is more yellowish in color.

This soil is suited to about the same crops and pasture plants as Muskogee silt loam, 1 to 5 percent slopes, but yields of cultivated crops are generally slightly lower. (Capability unit IIIe-5; woodland suitability group 6.)

Muskogee complex, mounded, 1 to 3 percent slopes (Maa).—From 15 to 30 percent of this mapping unit consists of sandy mounds. In the mounds, the A_1 or A_p layer is thin, brown or dark-brown very fine sandy loam. The A_2 layer is thick and consists of pale-brown to light yellowish-brown very fine sandy loam to a depth of about 30 inches or more. The differences between the layers are weakly expressed.

The soil between the sandy mounds is like Muskogee silt loam, 1 to 5 percent slopes. In many places the B_1 layer has faint mottles of pale brown.

This mapping unit is suited to about the same crops as Muskogee silt loam, 1 to 5 percent slopes. These areas are seldom cultivated because the mounds make them difficult to terrace or to cultivate on the contour. Most of them are in pasture or woodland. (Capability unit IIIe-5; woodland suitability group 7.)

Muskogee soils, 1 to 8 percent slopes, severely eroded (Mad).—This mapping unit consists of severely eroded areas of Muskogee silt loam. The surface layer ranges from silt loam to clay, and the subsoil is exposed over large areas. Most places have numerous shallow gullies.

The best use for this group of soils is pine woodland. (Capability unit VIIe-2; woodland suitability group 10.)

Myatt Series

The soils of the Myatt series are poorly drained. They are medium acid to very strongly acid. They have a gray to dark-gray silty surface soil. This is underlain by a gray or light-gray, medium textured to moderately fine textured subsoil, which in many places is mottled with yellowish brown.

These are fairly extensive soils, and the areas are medium to large. They occupy level places and depressions on stream terraces. The parent material is alluvium derived principally from reworked Coastal Plain sediments.

The Myatt soils are associated with the Stough, Bibb, and Kalmia soils. They are more poorly drained and more uniformly gray than the Stough soils. They are more poorly drained and less permeable than the moderately well drained Kalmia soils. Their color is similar to that of the Bibb soils, but they lie somewhat higher and have more distinct horizons. The Myatt soils are not flooded so frequently nor so deeply as the Bibb soils are.

The native vegetation was principally hardwoods. The chief species were willow oak, blackgum, sweetgum, and post oak, and there was a little loblolly pine. These soils are used mostly for woodland.

Myatt silt loam (Maf).—This soil has slopes of 0 to 1 percent. A typical profile under a cover of willow oak, taken while the soil was moist:

A_0 ¼ inch to 0, undecomposed oak leaves.

A_1 0 to 1 inch, dark-gray (10YR 4/1) silt loam; weak, medium, crumb and granular structure; very friable; fine roots abundant; medium acid; abrupt, smooth boundary; ½ to 1½ inches thick.

A_{2g} 1 to 15 inches, light brownish-gray (10YR 6/2) silt loam; very weak, medium, subangular blocky structure; friable when moist, slightly hard when dry; small, dark-brown concretions common; fine roots plentiful; numerous medium to large pores; dark-brown stains along root channels; strongly acid; clear, wavy boundary; 12 to 16 inches thick.

B_{2g} 15 to 29 inches, gray (10YR 6/1) silt loam that has pockets of slightly darker silty clay loam; numerous stains of yellowish brown around root channels and between cracks; a few clay flows in what appear to be old root channels; numerous krotovinas caused by crayfish; massive (structureless) to weak, coarse, prismatic structure; very firm when moist, hard when dry; few roots; very strongly acid; gradual, smooth boundary; 12 to 16 inches thick.

C_g 29 to 40 inches +, gray (10YR 5/1) silt loam or very fine sandy loam; common, medium, dark yellowish-brown (10YR 4/4) mottles and a few strong-brown (7.5 YR 5/6) mottles; massive; firm; few roots; very strongly acid.

In many places the A_{2g} horizon has weak, thin, platy structure and a light-gray (10YR 7/2) color. The lower boundary of this horizon is commonly irregular. In a few areas the C horizon is underlain by a D horizon of gray or dark-gray silty clay, mottled with light olive to yellowish brown.

Most areas have a few low mounds that cover less than 10 percent of the area. In these mounds, the A_2 horizon is thick and is pale brown to brownish yellow in color.

This soil is poorly suited to the common cultivated crops. Its suitability for forage plants is limited. All except a few small areas are used for woodland. This is not an extensive soil. (Capability unit IVw–1; woodland suitability group 11.)

Myatt complex, mounded (Mae).—Low sandy mounds occupy about 15 to 30 percent of the area of this mapping unit. The soil in these mounds has a thick A_2 horizon of very fine sandy loam and a B horizon of yellow or yellowish-brown, moderately well drained sandy clay loam. These horizons rest abruptly on mottled, gray and yellowish-brown sandy clay loam, silty clay loam, or silt loam. The soil between the sandy mounds is similar to Myatt silt loam. The slope range is 0 to 1 percent.

These areas are poorly suited to crops, and their suitability for forage plants is limited. All of this mapping unit is used for woodland. It is not very extensive. (Capability unit IVw–1; woodland suitability group 11.)

Myatt-Stough complex, overflow (Mag).—Soils of the Myatt series on level flats and in depressions make up about 50 percent of most areas of this complex. Soils of the Stough series on the slightly higher ridges make up another 30 percent. About 20 percent consists of Mixed wet alluvial land that lies in narrow bands along small intermittent streams. A typical Stough soil is described on page 48. The Mixed wet alluvial land is similar to that described on page 33. The slope range is 0 to 3 percent.

The soils in this complex are frequently flooded, but the floods usually last less than 48 hours. The Stough soils are seldom covered by more than a few inches of water.

These are extensive soils, but they are mapped together because of their intricate pattern, their similarities, and the fact that their use is severely limited by the frequent floods. They are best suited to woodland, and they are used for that purpose. (Capability unit Vw–1; woodland suitability group 4.)

Nacogdoches Series

The soils of the Nacogdoches series are reddish brown, well drained, and moderately permeable. The reaction ranges from neutral to strongly acid. The surface layer is reddish brown to dark reddish brown. The subsoil is reddish-brown to dark-red, friable loam to sandy clay. Ironstone concretions and fragments are common, especially in the A horizon.

These inextensive soils are on the upland. The largest areas are near Redland, northeast of Plain Dealing. The parent material consisted of sediments from the Cook Mountain formation. These sediments are high in iron oxides, and in a few places they contain some impure glauconitic sand.

In most places these soils are deep, but on a few very strong slopes they are less than 24 inches thick, and there are outcrops of large ironstone fragments. In most of these places, the soils are underlain by a thick bed of partly disintegrated, elliptical, ironstone concretions from 6 to 20 inches in diameter.

The Nacogdoches soils have a more reddish surface layer than the Kirvin and Luverne soils, with which they are chiefly associated. They are more deeply weathered and more permeable.

The native vegetation was a mixed forest of pine and hardwoods. All but the steepest slopes have been cultivated in the past. At present, more than 60 percent of the area has returned to woodland, chiefly of pine.

Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded (Nc).—This is a warm-natured soil that has been cultivated and is moderately eroded. A typical profile under 30-year-old pine, taken when the soil was moist:

A_p 0 to 11 inches, dark reddish-brown (5YR 3/3) gravelly fine sandy loam, about 20 percent of which consists of small, hard, ironstone fragments; moderate, fine, granular structure; very friable; many fine and medium roots; medium acid; abrupt, smooth boundary; 9 to 12 inches thick.

B_{21} 11 to 23 inches, dark reddish-brown (2.5YR 3/4) loam or light clay loam; weak, medium, subangular blocky structure that, when crushed, breaks down to fine, moderate, granular structure; friable and porous; about 15 percent consists of small, hard, ironstone fragments, and about 5 percent consists of ironstone fragments from 1 to 2 inches in diameter and coated with dark-red clay; numerous fine and medium roots; medium acid; gradual, smooth boundary; 10 to 14 inches thick.

B_{22} 23 to 34 inches, dark-red (2.5YR 3/6) loam or light clay loam; weak, medium, subangular blocky structure; friable; porous; 5 to 10 percent consists of small and medium ironstone fragments; numerous fine roots; strongly acid; diffuse, smooth boundary; 9 to 13 inches thick.

B_3 34 to 111 inches, dark-red (2.5YR 3/6) loam; weak, medium, subangular blocky structure; very friable when moist, slightly hard when dry; a few small and medium ironstone fragments; strongly acid; gradual, wavy boundary; 60 to 80 inches thick.

C 111 to 124 inches +, dark-red (2.5YR 3/6) sandy clay loam that has numerous pockets of yellowish-brown sandy loam and a few thin strata of gray clay; a few ironstone fragments; friable when moist, slightly hard when dry; very strongly acid.

The color of the A horizon ranges from reddish brown to dark reddish brown. Ironstone fragments constitute 15 to 40 percent of the A horizon but are generally less numerous in the B horizon.

The colors in the B horizon range from dark red to dark reddish brown. In a few areas the B horizon consists of friable sandy clay that has moderate to strong, fine, subangular blocky structure.

The depth to the C horizon ranges from about 60 to 120 inches. A few areas of this soil are underlain at a depth of more than 60 inches by platy, broken, iron-cemented sandstone that has yellow, olive, or brown sand between the plates.

A few areas contain only a few gravel-sized fragments of ironstone. Some minor areas of this soil have not been eroded. There are only a few hundred acres of this soil in the parish. Individual areas are generally small.

This soil is very responsive to good management. It was formerly highly prized for cotton, corn, and other crops. The capacity for available moisture is moderately low, but the natural fertility is somewhat higher than that of most of the associated soils. Most of this soil is now in young pine forest. (Capability unit IIIe–4; woodland suitability group 9.)

Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded (Ng).—This soil is well drained and moderately permeable. It is similar to Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded. There are many stony outcrops. A minor acreage has been severely eroded.

This soil is not suited to cultivated crops. Generally, the best use is woodland. (Capability unit VIe–1; woodland suitability group 9.)

Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded (Na).—This soil occupies a small acreage on rather narrow ridgetops. Its profile is similar to that of Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded. A few small areas are not eroded.

This soil is suited to about the same uses as Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes. A few small fields are cultivated to cotton, corn, and other crops. (Capability unit IIIe–4; woodland suitability group 9.)

Nacogdoches soils, 5 to 30 percent slopes, severely eroded (Ns).—These soils are severely gullied, due to past use. The surface texture ranges from fine sandy loam to clay loam or sandy clay loam. Numerous gullies penetrate into the B horizon.

Most of the individual areas are between 3 acres and 15 acres in size. Woodland is their only suitable use. (Capability unit VIIe–1; woodland suitability group 9.)

Ochlockonee Series

The soils of the Ochlockonee series are deep and well drained. They are medium acid to very strongly acid. The surface layer is dark grayish-brown fine sandy loam. It is underlain by brown to yellowish-brown very fine sandy loam to silt loam.

These soils formed in young alluvium that consisted chiefly of reworked Coastal Plain material. They occupy the highest parts of natural levees on the flood plains of local streams. The slope range is 0 to 2 percent. These are not very extensive soils, and the areas are generally small.

These soils are associated with the Iuka, Mantachie, and Bibb soils. They are better drained and more permeable than any of these soils. The Ochlockonee soils are free of mottling and more uniformly colored than the moderately well drained Iuka soils, the somewhat poorly drained Mantachie soils, and the poorly drained Bibb soils.

These soils are occasionally flooded, but the floods are usually of short duration. Individual areas may be isolated for several days while the lower soils around them are flooded.

A few acres in more accessible areas have been cleared and cultivated in the past. Most areas are now in woodland. A small percentage of the acreage is in pasture. In this parish, the Iuka soils were mapped in an undifferentiated unit with the Ochlockonee soils.

Ochlockonee and Iuka sandy loams (Oc).—This mapping unit consists of Ochlockonee sandy loam on the highest parts and of Iuka sandy loam on the next higher parts of natural levees on flood plains. The Ochlockonee soils are well drained, and the Iuka soils are moderately well drained.

The slope range is 0 to 2 percent, and the slopes are generally short and uneven. Abandoned stream channels in many places divide these areas into isolated ridges. These soils are occasionally flooded for a short time. They may be isolated for several days when the lower areas around them are flooded.

These two soils were mapped together because they are similar in characteristics that affect use and management. Individual areas contain either one or both of these soils. The acreage of the Iuka soil is limited.

A representative profile of Ochlockonee fine sandy loam in a pasture, taken while the soil was moist:

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam; moderate, medium and fine, crumb structure; very friable; many roots; medium acid; clear, smooth boundary; 6 to 9 inches thick.

AC 8 to 16 inches, brown (10YR 5/3) very fine sandy loam; friable; weak, fine, granular structure; many fine roots; medium acid; clear, smooth boundary; 7 to 9 inches thick.

C 16 to 40 inches, yellowish-brown (10YR 5/6) silt loam; weak, medium, granular structure; friable; strongly acid; clear, wavy boundary; 20 to 28 inches thick.

D 40 to 50 inches +, variegated yellowish-brown (10YR 5/6), strong-brown (7.5YR 5/6), and gray (10YR 6/1) silty clay loam; firm; a few dark-brown concretions; very strongly acid.

A representative profile of Iuka very sandy loam in a moist, wooded area:

A_{00} 1 to ½ inch, hardwood leaves and twigs.

A_0 ½ inch to 0, dark grayish-brown, partly decomposed hardwood leaves.

A_1 0 to 8 inches, dark-brown (10YR 4/3) very fine sandy loam; weak, medium, granular structure; very friable; many fine fibrous roots; medium acid; clear, smooth boundary; 6 to 9 inches thick.

AC 8 to 18 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, crumb structure; friable; numerous fine roots; strongly acid; clear, smooth boundary; 9 to 11 inches thick.

C_g 18 to 36 inches +, mottled yellowish-brown, pale-brown (10YR 6/3), and gray (10YR 6/1) silt loam in which the colors are in about equal proportions; friable to slightly firm; numerous dark-brown concretions; very strongly acid.

These soils occupy about 1,000 acres, but the individual areas are about 10 to 20 acres in size. Only a few areas have been cleared. Most of these are used for pasture or have returned to forest, which is in most places a mixture of loblolly pine and sweetgum. These soils are suited to cultivated crops, but, because of the small size of individual areas, isolation by abandoned channels, and occasional flooding, they are generally used for pasture or woodland. (Capability unit IIw–5; woodland suitability group 1.)

Orangeburg Series

The soils of the Orangeburg series are sandy, well drained, slightly acid to very strongly acid, and moderately permeable. The grayish-brown, sandy surface layer is underlain by a red or dark-red fine sandy loam or sandy clay loam subsoil.

These soils formed in sandy Coastal Plain sediments on the uplands. They are not very extensive. The largest areas are southwest of Plain Dealing.

The Orangeburg soils are associated with the Luverne, Ruston, Lakeland, and Eustis soils. The B horizon of the Orangeburg soils is redder than that of the Ruston soils and somewhat lighter textured and less distinct than that of the Luverne soils. The Orangeburg soils have finer texture and more distinct horizons than the Lakeland and Eustis soils. Their colors are stronger than those of the Lakeland soils.

The native vegetation on the Orangeburg soils was mostly shortleaf pine and a mixture of such hardwoods as red oak, blackjack oak, and hickory. The gently sloping to moderately sloping areas have been widely cultivated in the past. Most areas are now in woodland or unimproved pasture or are idle.

Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded (Og).—This is a sandy, well-drained, moderately permeable soil. Profile in a moist field, formerly cultivated but now in 15-year-old pine:

A_0 1 inch to 0, undecomposed pine needles.

A_p 0 to 7 inches, brown (10YR 5/3) fine sandy loam; weak, medium, crumb structure; very friable; many roots; medium acid; clear, smooth boundary; 6 to 8 inches thick.

B_1 7 to 14 inches, dark-red (2.5YR 3/6) fine sandy loam; weak, medium, subangular blocky structure; very friable; many fine roots; clear, smooth boundary; 6 to 8 inches thick.

B_2 14 to 34 inches, dark-red (2.5YR 3/6) light sandy clay loam; moderate, medium, subangular blocky structure; numerous clay bridges between sand grains and thin patchy clay films on blocks; friable when moist, slightly hard when dry; fine roots are common; strongly acid; gradual, smooth boundary; 18 to 22 inches thick.

B_3 34 to 56 inches, dark-red (2.5YR 3/6) fine sandy loam; weak, medium and coarse, subangular blocky structure; friable to very friable; a few roots; very strongly acid; clear, smooth boundary; 20 to 24 inches thick.

C 56 to 70 inches +, dark-red (2.5YR 3/6) and light-brown (7.5YR 6/4) stratified fine sandy loam that contains numerous uncoated sand grains; very friable; massive; very strongly acid.

The color of the B horizon ranges from red to dark red. In many places the B horizon contains only slightly more clay than the C horizon. Some minor areas have an A horizon of loamy fine sand.

This soil is fairly well suited to the commonly grown cultivated crops, hay, and pasture. It is well suited to pine woodland. (Capability unit IIIe–4; woodland suitability group 2.)

Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded (Or).—The profile of this soil is like that of Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded. There are a few shallow gullies.

This soil is fairly well suited to the common cultivated crops and to hay and pasture. It is well suited to pine woodland. Most of it is in woodland or is idle. (Capability unit IIIe–4; woodland suitability group 2.)

Orangeburg fine sandy loam, 1 to 5 percent slopes (Of).—This soil generally occupies ridgetops. It has a profile like that of Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded, except that the A horizon is 10 to 16 inches thick in most places. In a few undisturbed areas, the A_1 horizon is dark grayish brown and is underlain by an A_2 horizon of pale brown, light yellowish brown, or grayish brown. A few acres have an A horizon of loamy fine sand about 18 to 26 inches thick.

In use and suitability this soil is about the same as Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded. (Capability unit IIIe–4; woodland suitability group 2.)

Orangeburg fine sandy loam, 5 to 8 percent slopes (Om).—This soil is similar to Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded, except that it is somewhat more susceptible to erosion and its A horizon is slightly thicker. A minor acreage has an A horizon of loamy fine sand 18 to 26 inches thick.

Most of this soil is in woodland. (Capability unit IIIe–4; woodland suitability group 2.)

Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded (Ou).—These soils were mapped together because they are similar in characteristics that affect use and management. Individual areas consist of either one or both of these soils. The profile of the Ruston soil is similar to that described on page 43. Erosion caused by past use has made many shallow gullies.

These soils are not suited to cultivation. They are well suited to loblolly pine and shortleaf pine. Slopes of up to 12 or 14 percent are fairly well suited to permanent pasture. Most areas are now in woodland. (Capability unit VIe–1; woodland suitability group 2.)

Perry Series

The soils of the Perry series are poorly drained and very slowly permeable. Most of them are fine textured. They have a gray or dark-gray surface layer over a layer of mottled or mixed colors of gray and reddish brown.

Beneath, generally at a depth of more than 40 inches, is a layer of reddish-brown, mildly alkaline to moderately alkaline clay.

These are fairly extensive soils, but they lie in a rather narrow belt on the eastern margin of the Red River flood plain, principally along Bodcau Bayou, Red Chute Bayou, the Flat River, and Stillhouse Bayou. They occupy level places and depressions. The parent material is red-bed sediments mixed with some Coastal Plain sediments.

The Perry soils are associated chiefly with the Buxin, Roebuck, and Gallion soils. They are more poorly drained than the Buxin and Roebuck soils. They have poorer drainage and finer texture than the Gallion soils on natural levees.

The native vegetation was water-tolerant trees and an undercover of sedges. The principal trees were cypress, willow oak, overcup oak, cedar elm, pecan, green ash, hackberry, and willow. Most areas are now in scrubby cutover woodland.

Perry clay (Pa).—This soil has a slope of less than 1 percent. A typical profile in moist, cutover woodland:

A_1 0 to 4 inches, dark-gray (10YR 4/1) clay; reddish-brown stains along roots and root channels; a compound of strong, coarse, irregular blocky structure and moderate, very fine, subangular blocky structure; very firm when moist, very hard when dry, plastic when wet; numerous small, slightly hard concretions that have a black interior; numerous fine roots; medium acid; clear, smooth boundary; 3 to 5 inches thick.

AC 4 to 13 inches, dark-gray (10YR 4/1) clay; many pockets of reddish brown (5YR 4/3); moderate, medium, subangular blocky structure; numerous soft to moderately hard, black concretions; numerous fine roots; slightly acid; clear, smooth boundary; 8 to 11 inches thick.

C_{1g} 13 to 27 inches, dark-gray clay; a few pockets of reddish brown (5YR 4/3), 2 to 4 inches in diameter; a compound of weak, coarse, subangular blocky structure and moderate, fine, subangular blocky structure; firm when moist, very hard when dry; numerous soft concretions that are surrounded by spots of dark brown; a few fine and medium roots; neutral; clear, wavy boundary; 12 to 15 inches thick.

C_{2g} 27 to 44 inches, gray (10YR 5/1) clay; a few pockets of reddish brown (5YR 4/3) up to 2 inches in diameter; weak, coarse, subangular blocky structure; very firm when moist, very plastic when wet, very hard when dry; mildly alkaline; abrupt, wavy boundary; 15 to 20 inches thick.

D 44 to 54 inches +, reddish-brown (5YR 4/3) clay; a few small pockets of gray (10YR 5/1) in old root channels and crayfish holes; a compound of moderate, medium, subangular blocky structure that breaks to moderate, fine and very fine, angular blocky structure; very firm when moist, very plastic when wet, very hard when dry; numerous hard, black concretions; moderately alkaline; normally several feet thick.

Some areas have 4 to 8 inches of reddish-brown, neutral to moderately alkaline clay over the surface. This appears to have been recently deposited. The depth to the D horizon ranges from about 40 to 60 inches.

Runoff is likely to pond on the surface. Occasionally this soil is flooded by backwater. It is difficult to provide adequate surface drainage.

This soil is not extensive or important agriculturally. It is not well suited to the common cultivated crops. Its suitability for most improved pasture plants is limited. Most areas are in cutover woodland, and a minor acreage is unimproved pasture. (Capability unit IIIw–3; not suited to pines but can be used to grow hardwoods.)

Perry clay, overflow (Pb).—This soil is like Perry clay, but it is flooded more frequently. The frequent floods make this soil unsuitable for cultivated crops and severely limit its use for most improved pasture plants. The slope is less than 1 percent. (Capability unit Vw–2; not suited to pines but can be used to grow hardwoods.)

Perry soils, overflow (Pe).—The surface layer of the soils in this mapping unit is recently deposited alluvium that ranges in texture from sandy loam to silty clay. In other respects, the profile of each soil is similar to that of Perry clay. These soils are generally located where small drainageways enter the eastern margin of the Red River flood plain. The slope is less than 1 percent.

These soils are not suited to cultivated crops or to improved pasture. All areas are in woodland. (Capability unit Vw–2; not suited to pines but can be used to grow hardwoods.)

Pheba Series

The soils of the Pheba series are somewhat poorly drained and medium acid to extremely acid. They have a grayish-brown sandy surface layer. The upper part of the subsoil is yellow or yellowish brown, friable, and more clayey than the surface layer. It is underlain by a dominantly gray fragipan.

These soils formed on level to gently sloping uplands, from stratified Coastal Plain sediments, most of which were medium to moderately fine in texture.

The Pheba soils are associated principally with the Savannah and Sawyer soils. They are more poorly drained than the Savannah soils. The Sawyer soils have better drainage and a finer textured B horizon than the Pheba soils, and they lack the well-developed fragipan characteristic of the Pheba soils.

The native vegetation was a mixed forest of upland hardwoods and loblolly pine. These inextensive soils are mostly in woodland. A minor acreage is in pasture, most of which is unimproved.

Pheba very fine sandy loam, 0 to 3 percent slopes (Pk).—This is a somewhat poorly drained soil that has a fragipan. A typical profile in a moist, unimproved pasture with a cover of carpetgrass:

A_p 0 to 7 inches, grayish-brown (10YR 5/2) very fine sandy loam; weak, medium, subangular blocky and granular structure; very friable; a few dark-brown, medium-hard, small concretions; numerous roots; strongly acid; clear, smooth boundary; 6 to 8 inches thick.

B_1 7 to 14 inches, yellow (10YR 7/6) light sandy clay loam that has a few, small to medium, distinct mottles of light brownish gray (2.5Y 6/2); weak, medium, subangular blocky structure; friable; grass roots are common; strongly acid; clear, smooth boundary; 5 to 8 inches thick.

B_2 14 to 22 inches, yellow (10YR 7/6) heavy sandy clay loam; common, fine and medium mottles of light brownish gray (2.5Y 6/2); moderate, medium, subangular blocky structure; a few thin patchy clay films; friable when moist, hard when dry; a few grass roots; very strongly acid; clear, wavy boundary; 6 to 9 inches thick.

B_{3mg1} 22 to 34 inches, light brownish-gray (2.5Y 6/2) sandy clay loam; many, medium, distinct mottles of yellow (10YR 7/6); a few soft concretions that have a dark-red interior and an exterior coated with light-gray silt; very weak, coarse, subangular blocky structure; firm in place, friable when crushed, hard when dry; very few roots; extremely acid; gradual, wavy boundary; 11 to 13 inches thick.

B_{3mg2} 34 to 42 inches, light brownish-gray (2.5Y 6/2) sandy clay loam; common, medium, prominent mottles of yellowish brown (10YR 5/6); contains a few pockets of silty clay or silty clay loam; very weak, medium, subangular blocky structure; very firm in place, friable when crushed, very hard when dry; extremely acid; clear, wavy boundary; 6 to 9 inches thick.

B_{3mg3} 42 to 60 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, faint mottles of brown (10YR 5/3); a few small pockets of clay; many hard concretions, 5 to 50 mm. in diameter, that have a black interior; massive; friable when moist, hard when dry; strongly acid; abrupt, wavy boundary; 16 to 20 inches thick.

D 60 to 70 inches +, gray (10YR 5/1) clay distinctly mottled with yellowish brown (10YR 5/6); a few pockets of sandy clay loam; moderate, coarse, subangular blocky structure; very firm when moist, very hard when dry; strongly acid.

The fragipan varies in thickness and in degree of expression. Over a few acres, there is little evidence of a fragipan. In most places the fragipan is from 20 to 48 inches thick. Its development seems to be related to the presence of a very slowly permeable D layer, generally at a depth of more than 50 inches. Profiles that do not have this fine-textured substratum generally do not have a thick fragipan.

A few areas have a predominantly gray, poorly drained profile. These small areas occupy slopes of less than 1 percent in slight depressions near the heads of small intermittent drainageways. The somewhat poorly drained profiles that do not have a fragipan become progressively more fine textured with depth. At a depth of about 30 inches, they are generally a sandy clay.

Most areas have a few scattered mounds in which the A_2 horizon is thick and internal drainage is slightly better than in the rest of this soil.

This is a slowly permeable soil that has a perched water table in winter and early in spring. The natural fertility and the content of organic matter are both low.

This soil is not well suited to the common cultivated crops, mainly because of wetness and somewhat poor internal drainage. Most areas are in woodland or permanent pasture. (Capability unit IIw–3; woodland suitability group 3.)

Pheba complex, mounded, 0 to 3 percent slopes (Ph).—Numerous mounds make up from 15 to 30 percent of the area of this complex. The soil between the mounds is like Pheba very fine sandy loam, 0 to 3 percent slopes. The mounds are a little better drained than the areas between them. They are generally somewhat coarser in texture in the upper layers. They interfere with natural surface drainage and make tillage and row drainage more difficult.

These soils are not well suited to the common cultivated crops. They are fairly well suited to pasture and well suited to pine woodland. Nearly all of the acreage is now used for woodland or permanent pasture. (Capability unit IIIw–4; woodland suitability group 3.)

Prentiss Series

The soils of the Prentiss series are moderately well drained, slowly permeable, and slightly acid to extremely acid. They have a compact fragipan in the lower part of their subsoil. The surface layer is grayish brown to yellowish brown and sandy or silty. The upper part of the subsoil is brownish-yellow or yellowish-brown sandy or silty clay loam. This rests rather abruptly on the mottled, brownish-yellow, brown, and gray fragipan. In most areas there is a substratum of plastic clay or silty clay.

These soils are extensive on the broad stream terraces of the eastern part of Bossier Parish. Small areas lie along most of the larger streams in the uplands. These soils formed from alluvium composed chiefly of sediments from the Coastal Plain or from red beds.

The Prentiss soils are associated principally with soils of the Tilden, Stough, Cahaba, and Kalmia series. The upper part of their subsoil is more yellow than the strong-brown to yellowish-red upper part of the subsoil in the Tilden soils. They are better drained than the Stough soils, and their subsoil is less mottled. The Prentiss soils are characterized by a mottled, compact fragipan, while the Cahaba and Kalmia soils have a uniform color to a depth of 30 inches or more, and they do not have a fragipan.

The native vegetation on these soils was a forest of loblolly pine and hardwoods, principally oaks. Most of these areas are now in woodland or pasture. A few areas are cultivated, but the trend is toward a smaller acreage under cultivation.

Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes (Pr).—This is a moderately well drained, slowly permeable, acid soil on gently sloping parts of stream terraces. It has a fragipan. A typical profile in a moist area formerly cultivated but now idle:

A_p 0 to 9 inches, dark yellowish-brown (10YR 4/4) very fine sandy loam; moderate, fine, granular structure; very friable; a few small, dark-brown, rounded concretions; medium acid; abrupt, wavy boundary; 7 to 9 inches thick.

B_1 9 to 14 inches, yellowish-brown (10YR 5/4) sandy clay loam; weak, coarse, subangular blocky structure; friable; strongly acid; clear, wavy boundary; 4 to 6 inches thick.

B_2 14 to 26 inches, brownish-yellow (10YR 6/6) silty clay loam; a few mottles of red (10YR 4/6) in the lower part; moderate, medium and fine, subangular blocky structure; thin patchy clay films; friable; a few small, dark-brown concretions; strongly acid; abrupt, wavy boundary; 11 to 14 inches thick.

B_{3m} 26 to 44 inches, brownish-yellow (10YR 6/6) silt loam or light silty clay loam; mottles of very pale brown (10YR 7/3), light yellowish brown (10YR 6/4), and gray (10YR 6/1); coarse, irregular blocky structure; many structural faces are coated with light-gray silt; compact; firm in place, but easily crushed when moist, hard to very hard when dry; many small, hard, dark-brown concretions that have a black interior; very strongly acid; clear, irregular boundary; 16 to 20 inches thick.

D 44 to 60 inches +, gray (10YR 6/1) clay; mottles of brownish yellow (10YR 6/6) and red (2.5YR 4/6); moderate, coarse, angular blocky structure; has coatings of light-gray silt on structural faces; extremely acid.

In undisturbed wooded areas, the A_1 horizon ranges from dark grayish brown to dark brown and is underlain by a pale-brown to light yellowish-brown A_2 horizon. Some of the more nearly level areas may have a B_1 horizon that is mottled with pale brown. A few areas have an A horizon of silt loam and a B horizon of silty clay loam. The depth to the clay substratum ranges from 40 to 50 inches.

Included are a few small areas of Stough soils in depressions and of Tilden soils on slight ridges. In most places, a few sandy mounds are present.

This soil is low in natural fertility, low in content of organic matter, and moderate in capacity for available moisture.

This soil is fairly well suited to the common cultivated crops and to hay and pasture. It is well suited to pine woodland. At present, less than 10 percent is cultivated, about 70 percent is wooded, and 20 percent is in permanent pasture or is idle. (Capability unit IIe-3; woodland suitability group 3.)

Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes (Pp).—This soil has a profile similar to that of Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes. The internal drainage is somewhat poorer, and in most places the B_1 horizon is faintly mottled. Wetness is a moderate problem.

This inextensive soil is suited to about the same uses as Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes. It is mostly in woodland. (Capability unit IIw-3; woodland suitability group 3.)

Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded (Ps).—The surface layer of this soil is thinner than that of Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes. This soil has shallow gullies, and in a few spots the B horizon has been mixed into the surface layer in plowing.

The suitability of this soil for crops is about the same as that of the uneroded soil, but yields of most cultivated crops are usually slightly less. This soil is fairly well suited to pasture and is well suited to pine woodland. Most areas are now in woodland or pasture. A very few acres are used for cultivated crops, and a few more acres that were formerly cultivated are now idle. (Capability unit IIe-3; woodland suitability group 3.)

Prentiss complex, mounded, 0 to 1 percent slopes (Pm).—This is a nearly level, slowly permeable, slightly wet, moundy mapping unit. The mounds cover about 15 to 30 percent of the area and interfere with natural surface drainage. In most places the A horizon of the mounds is fine sandy loam or very fine sandy loam, and the A horizon of the soil between the mounds is silt loam or very fine sandy loam. The A_2 horizon of the soils on the mounds is generally much thicker than that of the soils between the mounds.

This is an inextensive mapping unit. Most of it is in woodland. (Capability unit IIIw-4; woodland suitability group 3.)

Prentiss complex, mounded, 1 to 5 percent slopes (Pn).—This mapping unit is very similar to Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, except for numerous mounds that cover about 15 to 30 percent of the area. The A horizon of the soil on the mounds consists of very fine sandy loam or fine sandy loam, but the A horizon of the soil between the mounds consists of silt loam or very fine sandy loam.

Yields of cultivated crops are generally lower on soils of this mapping unit than on areas of similar soils without mounds. The mounds make contour tillage and terracing difficult. Growth and maturing of crops is uneven because of the variations in surface texture and drainage. Most areas that were formerly cultivated are now used for woodland or pasture. This is an extensive mapping unit. (Capability unit IIIe-5; woodland suitability group 3.)

Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes (Pt).—These are slightly wet, moderately well drained to somewhat poorly drained, slowly permeable soils that occupy nearly level areas on stream terraces. The somewhat poorly drained Stough silt loam, clay substratum, occupies slight depressions, and Prentiss silt loam, clay substratum, occupies the slightly higher lying low ridges. Most areas of this mapping unit contain both soils. They are mapped together because they are closely associated and they are similar in most of the characteristics that affect their use and management.

A typical Prentiss soil is described on page 40, and a typical Stough soil is described on page 48.

These are moderately extensive soils. They are used chiefly for woodland. A few small areas that were formerly cultivated are now in permanent pasture. (Capability unit IIw-3; woodland suitability group 3.)

Prentiss very fine sandy loam, 0 to 1 percent slopes (Po).—This moderately well drained soil occupies a small acreage on terraces along small streams flowing through the uplands. It is similar in profile characteristics to Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, except that it is underlain by sandy loam instead of clay.

Individual areas of this soil are small. Use is determined chiefly by the use of the more sloping surrounding soils. At present, most areas are in pasture or woodland. (Capability unit I-3; woodland suitability group 5.)

Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes (Pv).—This mapping unit consists of Prentiss very fine sandy loam and Tilden very fine sandy loam mapped together because they are similar in the characteristics that affect management. Most of the individual areas are small and consist only of one soil or the other, but some areas contain both soils. A larger proportion of the unit consists of the Prentiss soil than of the Tilden soil.

These are moderately well drained soils that have a fragipan. They lie on gently sloping terraces along small streams on the uplands. The upper part of the subsoil is yellowish brown to yellowish red. The lower part of the subsoil is a fragipan that lies above a sandy substratum. A typical Prentiss soil is described on page 40, and a typical Tilden soil is described on page 50.

These soils were formerly widely cultivated, but most areas are now in woodland or pasture or are idle. A few small areas are occasionally planted to cotton, corn, or crops for home use. (Capability unit IIe-3; woodland suitability group 5.)

Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded (Pw).—These soils have profiles similar in most characteristics to those of Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes. They have a somewhat thinner surface layer, numerous shallow gullies, and a few spots where the upper part of the B horizon has been mixed into the plow layer.

These are not extensive soils. Most areas are used for pasture or woodland. (Capability unit IIe-3; woodland suitability group 5.)

Riverwash

This is a land type that consists of recently deposited, slightly acid to moderately alkaline sand, silt, and clay. It occupies frequently flooded areas on the present flood plain of the Red River.

Most of the material is sandy, but there are many thin layers of clay and silt. The profiles are not uniform from place to place. At frequent intervals during floods, fresh material is deposited or several feet of material is washed away. In this manner the upper layers change from one year to another. The slopes are uneven. The slope range is generally from less than 1 percent to 3 percent, but there are some short slopes of as much as 5 percent.

Willows quickly become established on freshly deposited material. Most of the higher areas support a thick stand of willow or cottonwood trees. Floodwaters and shifting channels often destroy previously established stands of trees and brush.

Riverwash (Ra).—The soil material in this land type varies considerably from place to place. No single profile is typical. The following profile illustrates in a general way the nature of the materials when moist.

1. 0 to 10 inches, brown (7.5YR 5/4) very fine sand; weak, thick, platy structure; loose; moderately alkaline; abrupt, smooth boundary.
2. 10 to 15 inches, light yellowish-brown (10YR 6/4) very fine sand; single grain (structureless); loose; slightly acid; abrupt, smooth boundary.
3. 15 to 24 inches, brown (7.5YR 5/4) very fine sandy loam; weak, medium, platy structure; very friable; neutral; abrupt, wavy boundary.
4. 24 to 28 inches, reddish-brown (5YR 4/4) silt loam; massive (structureless); firm; moderately alkaline; abrupt, wavy boundary.
5. 28 to 40 inches +, light yellowish-brown (10YR 6/4) loamy fine sand; single grain (structureless); loose; moderately alkaline.

Lack of uniformity in texture and other characteristics is typical of the layers in Riverwash. Profiles a short distance apart are commonly quite different. Some include layers of clay or silty clay several inches thick.

These areas are used for what grazing happens to be available during the summer and autumn and for production of timber. Cottonwood and willow trees grow rapidly and are harvested mostly for pulpwood. (Capability unit Vw-3.)

Roebuck Series

The soils of the Roebuck series are reddish-brown, neutral to moderately alkaline, and somewhat poorly drained to moderately well drained. Most of them are fine textured.

These soils formed principally in sediments brought by the Red River from red beds in Texas and Oklahoma.

The Roebuck soils are associated chiefly with the Miller, Buxin, and Gallion soils. They lie between the Miller soils on the slack-water flats and the Gallion soils along the natural levees of former river courses or tributaries. The Roebuck soils are more mottled and less red than the Miller soils. They do not have the distinct gray layers that the Buxin soils have. The Roebuck soils are less well drained and have finer textured lower horizons than the Gallion soils.

The native vegetation was a mixed forest of bottom-land hardwoods.

These are extensive and important agricultural soils. They are used chiefly for cultivated crops, hay, and pasture. A few areas are in cutover woodland.

Roebuck clay, 0 to 1 percent slopes (Rb).—This is the most extensive soil in the Roebuck series. It is a very slowly permeable, somewhat poorly drained, fine-textured soil of the Red River bottom land. A profile in a moist, cultivated area:

A_p 0 to 5 inches, dark reddish-brown (5YR 3/3) clay; moderate, medium, granular structure and fine, subangular blocky structure; very firm when moist, plastic when wet, hard but crumbly when dry; neutral; clear, smooth boundary; 4 to 6 inches thick.

C_1 5 to 24 inches, reddish-brown (5YR 4/4) clay; many fine and medium mottles of dark brown (7.5YR 3/2) and a few small pockets of dark gray (5YR 4/1); strong, medium and coarse, angular blocky structure; very firm when moist, very plastic when wet, very hard when dry; a few small, hard, dark-brown concretions; mildly alkaline; gradual, smooth boundary; 16 to 22 inches thick.

C_2 24 to 42 inches +, reddish-brown (5YR 4/4) clay; strong, medium and coarse, angular blocky structure; very firm when moist, very plastic when wet, very hard when dry; moderately alkaline.

The color of the A horizon ranges from dark brown to dark reddish brown (7.5YR to 2.5YR). In many places the C_1 horizon is mottled and splotched with various shades of brown and gray. It may contain a few thin, dark-gray strata. The C horizons contain a few strata of brown or reddish-brown silty clay loam. The reaction of various horizons ranges from slightly acid to moderately alkaline. In many places the C_2 horizon is calcareous.

A few acres in this mapping unit have a silty clay surface soil. Some small areas of Buxin clay and Gallion clay are included.

This soil has moderately high natural fertility and a moderately high capacity for available moisture. It is difficult to maintain the plastic clay surface layer in good tilth. Wide cracks form when the soil dries. The soil is wet and water ponds on the surface during periods of high rainfall, because of the very slow permeability of the soil. This is especially common where the surface is uneven. Adequate surface drainage must be provided before satisfactory yields of crops and improved pastures can be obtained.

This soil is fairly well suited to the common cultivated crops and to most hay and pasture plants. About 60 percent of it is now used for pasture or hay, about 25 percent is cultivated, and about 15 percent is in woodland. The present trend is a decrease in the acreage of cultivated crops and an increase in the acreage of pasture. (Capability unit IIIw-1; not suited to pines but can be used to grow hardwoods.)

Roebuck clay, 1 to 3 percent slopes (Rc).—The profile of this soil is like that of Roebuck clay, 0 to 1 percent slopes. The soil generally occupies small areas along the borders of natural drainageways. Slopes are short. Running the rows across the slope ordinarily provides adequate control of runoff. Wetness is less troublesome in this soil than on lesser slopes.

About 80 percent of this soil is used for pasture or hay, 10 percent is cultivated, and 10 percent is in woodland. (Capability unit IIIe-1; not suited to pines but can be used to grow hardwoods.)

Roebuck clay, undulating (Re).—A topography of low, winding depressions and narrow ridges is characteristic of this soil. The slopes are complex and uneven. The slope range is 0 to 3 percent. The profile of this soil is very similar to that of Roebuck clay, 0 to 1 percent slopes.

The uneven surface makes it difficult to establish and maintain adequate surface drainage. Yields of the common cultivated crops are considerably reduced in wet years. About 70 percent of this soil is now used for pasture or hay, about 15 percent is cultivated, and 15 percent is used for woodland. (Capability unit IIIw–2; not suited to pines but can be used to grow hardwoods.)

Roebuck clay, overflow, 0 to 1 percent slopes (Rd).—This is a fine-textured, very slowly permeable soil. It occupies low areas that are frequently flooded by backwater from tributaries of the Red River, usually during the spring. The important characteristics of the profile are not significantly different from those of Roebuck clay, 0 to 1 percent slopes.

This soil is not suited to cultivated crops. Its suitability for most of the improved pasture plants is limited. About 90 percent is wooded. About 10 percent is used for seasonal grazing or occasionally mowed for hay. The largest areas are in the southern part of the parish. (Capability unit Vw–2; not suited to pines but can be used to grow hardwoods.)

Roebuck silt loam, 0 to 1 percent slopes (Rf).—This is a slowly permeable, somewhat poorly drained soil that generally occupies the margins or backslopes of the older natural levees, chiefly those along tributaries of the Red River. The A horizon consists of brown (7.5YR 5/2) to dark grayish-brown (10YR 4/2) silt loam, 6 to 8 inches thick. The profile is otherwise very similar to that of Roebuck clay, 0 to 1 percent slopes. In a few areas the profile is underlain by medium-textured material at a depth of more than 30 inches.

This soil is fairly well suited to cotton and to the other common cultivated crops. It is well suited to most pasture and hay plants. About 60 percent of it is used for pasture or hay, about 30 percent is cultivated, and 10 percent is in woodland. Individual areas are generally small. (Capability unit IIw–2; not suited to pines but can be used to grow hardwoods.)

Ruston Series

The soils of the Ruston series are well drained, slightly acid to extremely acid, and low in natural fertility. They have a dark grayish-brown to brown sandy surface layer and a strong-brown to yellowish-red sandy clay loam subsoil.

These soils are extensive and widely distributed in the uplands, particularly in the north-central part of the parish near Plain Dealing. They formed on gentle to very strong slopes from stratified, unconsolidated beds of acid sandy loam and sandy clay loam of Coastal Plain origin.

The Ruston soils are associated principally with the Shubuta, Savannah, Bowie, Luverne, and Orangeburg soils. The B horizon of the Ruston soils is coarser textured, more permeable, and less red than the B horizons of the Shubuta and Luverne soils. It is similar in texture to, but is less red in color than, the B horizon of the Orangeburg soils. The Ruston soils have better drainage than the Savannah and Bowie soils, and they do not have the fragipan that is characteristic of the Savannah soils.

The native vegetation was a mixed forest of shortleaf pine, loblolly pine, and upland hardwood trees. A high percentage of the gently sloping to moderately sloping Ruston soils have been cultivated, but many areas have returned to forest. At present, about 75 percent of the acreage is in woodland, 15 percent is used for pasture, 5 percent is cultivated, and 5 percent is idle cropland.

Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded (Ro).—Profile in a moist area formerly cultivated but now in 10-year-old pine:

A_p 0 to 6 inches, dark-brown (10YR 4/3) fine sandy loam; weak, medium, granular structure; very friable; a few small, hard, brown concretions; numerous roots; medium acid; abrupt, smooth boundary.

B_1 6 to 10 inches, yellowish-red (5YR 5/8) fine sandy loam; weak, fine to medium, subangular blocky structure; friable; a few small, hard, brown concretions; many roots; strongly acid; clear, smooth boundary.

B_{21} 10 to 18 inches, yellowish-red (5YR 4/8) sandy clay loam; moderate, fine to medium, subangular blocky structure; numerous clay bridges between sand grains; thin, patchy clay films on blocks; friable; a few medium, hard concretions; roots are common; very strongly acid; clear, smooth boundary.

B_{22} 18 to 24 inches, strong-brown (7.5YR 5/6) sandy clay loam; moderate, medium, angular blocky structure; thin patchy clay films on blocks; friable; common, medium, hard concretions; roots are common; very strongly acid; clear, wavy boundary.

B_3 24 to 29 inches, strong-brown (7.5YR 5/6) loam that has few, medium, distinct mottles of dark red (2.5YR 3/6); moderate, fine, subangular blocky structure; friable; common, medium, hard concretions; a few roots; extremely acid; clear, wavy boundary.

D_1 29 to 36 inches, variegated dark-red (2.5YR 3/6) and yellowish-brown (10YR 5/4) sandy clay loam that has pockets of sandy loam; weak, fine, angular blocky structure; firm when moist, hard and brittle when dry; common, medium and large, hard concretions and ironstone fragments; a few roots; extremely acid; gradual, smooth boundary.

D_2 36 to 46 inches +, variegated dark-red (2.5YR 3/6) and yellowish-brown (10YR 5/4) sandy clay loam that has pockets of sandy loam; weak, fine, angular blocky structure; very firm when moist, very hard and brittle when dry; common, medium and large, hard concretions; very few roots; extremely acid.

The B_{21} and B_{22} horizons range in color from strong brown to yellowish red and in texture from sandy clay loam to clay loam. In some areas the B_1 horizon is very thin or absent.

The D horizon is thought to be a former weathering zone in the upper part of a formation different from the overlying material in which the Ruston soil developed. The depth to this hard substratum ranges from 26 to 36 inches. The thickness of the substratum ranges from 20 inches to several feet.

In some small areas this soil is not eroded and the A horizon is 10 to 12 inches in thickness. Small areas of Savannah very fine sandy loam and Shubuta fine sandy loam are included.

The natural fertility is low. The organic-matter content is low. The capacity for available moisture is moderately low. The A and B horizons are moderately permeable and well drained. The D horizons are hard and slowly permeable.

This is the most extensive Ruston soil in this parish. If well managed, it is fairly well suited to most of the common cultivated crops and pasture plants. About 60 percent of the acreage is in woodland, and about 30 percent is in pasture. About 10 percent is used for cultivated crops or is idle. (Capability unit IIIe–4; woodland suitability group 5.)

Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes (Rn).—This soil is like Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded, except that it has a thicker surface layer. In most places the A horizon is 10 to 12 inches thick. In undisturbed woodland, this soil has a dark-brown or dark grayish-brown A_1 horizon that is 2 to 3 inches thick, and a pale-brown, light yellowish-brown, or grayish-brown A_2 horizon that is 7 to 10 inches thick. A minor acreage has an A horizon of loamy fine sand that is 14 to 18 inches thick.

This soil is used in about the same way and is suited to about the same crops as the eroded phase, but the yields of cultivated crops are normally a little higher. (Capability unit IIIe–4; woodland suitability group 5.)

Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes, eroded (Rt).—The profile of this soil is like that of Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded.

This soil is not suited to continuous use for row crops. It can be cultivated occasionally after several years in broadcast crops or sod crops. Most areas that have been cultivated have returned to woodland. About 80 percent of the acreage is now wooded, and 15 percent is in pasture. About 5 percent is idle cropland or is cultivated intermittently. (Capability unit IVe–1; woodland suitability group 5.)

Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes (Rs).—This soil is similar to Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded, but it has a thicker surface layer. In most places there is a dark-brown to dark grayish-brown A_1 horizon that is 2 to 3 inches thick over a pale-brown, yellowish-brown, or grayish-brown A_2 horizon that is 7 to 10 inches thick.

Most of this inextensive soil has never been cultivated. It is not suited to continuous use for row crops. It can be cultivated for 1 or 2 years after several years of broadcast crops or sod crops. About 90 percent is now in woodland, and 10 percent is in pasture. Less than 1 percent is cultivated. (Capability unit IVe–1; woodland suitability group 5.)

Ruston fine sandy loam, 1 to 5 percent slopes, eroded (Rh).—To a depth of about 30 inches, this soil and Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded, are similar. Below this depth, they differ considerably in consistence, texture, and permeability. The B horizon of the hard substratum phase is underlain by a D horizon of sandy clay loam that is hard or very hard when dry. The B horizon of this soil, however, is underlain by one or more C horizons of very friable, rapidly permeable fine sandy loam, several feet in thickness.

The use of this soil is not significantly different from that of the hard substratum phase. It is suited to the same crops and pasture plants, and yields are similar. The site indexes for loblolly pine and shortleaf pine are higher than on the hard substratum phase. (Capability unit IIIe–4; woodland suitability group 2.)

Ruston fine sandy loam, 1 to 5 percent slopes (Rg).—This soil has an A horizon 10 to 14 inches thick. Otherwise, to a depth of about 30 inches, it is similar to Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded. This soil has no hard substratum.

This soil is suited to the same crops and pasture plants as the hard substratum phase and is used in the same way. The yields of cultivated crops and pasture plants are similar, but yields of loblolly pine and shortleaf pine are higher on this soil. (Capability unit IIIe–4; woodland suitability group 2.)

Ruston fine sandy loam, 5 to 8 percent slopes, eroded (Rm).—The profile of this soil, to a depth of about 30 inches is very similar to that of Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded. It does not have a hard, slowly permeable substratum.

This very inextensive soil is largely in woodland. It is well suited to loblolly pine and shortleaf pine. (Capability unit IIIe–4; woodland suitability group 2.)

Ruston fine sandy loam, 5 to 8 percent slopes (Rk).—The A horizon of this soil is several inches thicker than that of Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded, but the profiles are otherwise similar to a depth of about 30 inches. This soil does not have a hard substratum.

Almost all of this very inextensive soil is in woodland. It produces higher yields of loblolly pine and shortleaf pine than the hard substratum phase. (Capability unit IIIe–4; woodland suitability group 2.)

Ruston soils, 1 to 8 percent slopes, severely eroded (Ru).—This mapping unit consists of various Ruston soils, many of them hard substratum phases. The individual areas are generally small. The B horizon is exposed over much of the area. Shallow gullies are numerous, and in most places there are a few large gullies.

Woodland is probably the best use for these soils. Most areas are idle or are covered with scattered pines. (Capability unit VIIe–1; woodland suitability group 5.)

Savannah Series

The soils of the Savannah series are moderately well drained. They are characterized by a fragipan. These soils have a grayish-brown very fine sandy loam surface layer and a dominantly yellowish-brown sandy clay loam subsoil. The mottled fragipan is about 20 to 30 inches below the surface.

These soils generally occur in small areas fairly well distributed over the uplands in the north-central part of the parish. They formed in stratified sandy loam and sandy clay loam Coastal Plain material. The slope range is 1 to 5 percent.

The Savannah soils are commonly near or adjacent to the Bowie and Ruston soils, especially the hard substratum phases of the Ruston soils. In some areas they are associated with the Pheba and Shubuta soils. The Savannah soils are more mottled than the Bowie soils, which have no fragipan. The Savannah soils have a dominantly yellowish-brown subsoil, while the Ruston soils have a strong-brown to yellowish-red subsoil. The Savannah soils are better drained and less mottled than the Pheba soils, and their B and C horizons are more friable and coarser textured than those of the Shubuta soils.

The natural vegetation was a mixed forest of upland hardwoods, loblolly pine, and shortleaf pine. About 70 percent of the acreage is now wooded, 20 percent is in pasture, 2 percent is cultivated, and 8 percent is idle.

In Bossier Parish, the Savannah soils are mapped with the Bowie soils. Most of the areas contain a mixture of both soils, but some contain only Savannah soils or Bowie soils.

Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes (Sa).—This mapping unit consists of Savannah very fine sandy loam and Bowie very fine sandy loam on broad ridges or foot slopes on the uplands. These soils are moderately well drained and medium acid to extremely acid. The Savannah soil has a fragipan at a depth of 20 to 30 inches, while the Bowie soil has none. The Savannah soil is more mottled than the Bowie soil. A larger percentage of the unit consists of the Savannah soil than of the Bowie soil.

A profile of Savannah very fine sandy loam in a moist area formerly cultivated but now under a cover of broomsedge:

A_{p1} 0 to 2 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; weak, medium, granular structure; very friable; many fine fibrous roots; medium acid; abrupt, smooth boundary; 1 to 2 inches thick.

A_{p2} 2 to 8 inches, grayish-brown (10YR 5/2) very fine sandy loam that has dark-brown stains around the numerous fine roots; very weak, medium, granular structure; friable; medium acid; clear, smooth boundary; 4 to 7 inches thick.

B_1 8 to 12 inches, brownish-yellow (10YR 6/8) very fine sandy loam; weak, medium and fine, subangular blocky structure; friable; numerous fine roots; clear, smooth boundary; 4 to 6 inches thick.

B_2 12 to 22 inches, yellowish-brown (10YR 5/6) sandy clay loam; a few, fine, faint mottles of strong brown (7.5YR 5/6); friable when moist, slightly hard when dry, slightly sticky when wet; thin patchy clay films; numerous fine roots; strongly acid; clear, wavy boundary; 8 to 13 inches thick.

B_{3m} 22 to 36 inches, yellowish-brown (10YR 5/6) sandy clay loam mottled with about 30 percent yellowish red (5YR 4/6) and 20 percent light brownish gray (10YR 6/2); weak, coarse, subangular blocky structure; firm in place, friable but brittle when crushed, hard to very hard when dry; numerous soft, dark-brown concretions and a few hard concretions that have a black interior; numerous vesicular pores; a few roots; extremely acid.

C_1 36 to 46 inches, yellowish-brown (10YR 5/6) sandy loam or loam mottled with strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2); weak, medium to coarse, subangular blocky structure; a few small, hard concretions that have a black interior; numerous small pockets of light-gray very fine sand in vertical cracks; extremely acid.

The thickness of the A horizon ranges from 6 to 14 inches. The color of the B_2 horizon ranges from light brownish yellow (10YR 6/4) to yellowish brown (10YR 5/8). Some profiles have distinct mottling in the B_2 horizon. The depth to the fragipan ranges from 18 to 30 inches. The C horizon in some profiles contains less gray and more red than the one described.

A profile of Bowie very fine sandy loam in a moist area formerly cultivated but now under a young stand of pines:

A_p 0 to 5 inches, brown (7.5YR 5/2) very fine sandy loam; many bleached sand grains; weak, medium, crumb structure; very friable; medium acid; clear, smooth boundary; 4 to 6 inches thick.

A_2 5 to 14 inches, pale-brown (10YR 6/3) very fine sandy loam; many yellowish-brown worm casts; very weak, medium, crumb structure; very friable; strongly acid; clear, smooth boundary; 6 to 8 inches thick.

B_1 14 to 20 inches, yellowish-brown (10YR 5/8) fine sandy loam; weak, medium, subangular blocky structure; very friable; very strongly acid; gradual, smooth boundary; 5 to 7 inches thick.

B_2 20 to 33 inches, yellowish-brown (10YR 5/6) sandy clay loam; a few small spots of yellowish red (5YR 5/6), which appear to be soft concretions; moderate, medium, subangular blocky structure; thin, patchy clay films; friable; very strongly acid; gradual, smooth boundary; 12 to 14 inches thick.

B_3 33 to 44 inches, yellowish-brown (10YR 5/8) fine sandy loam; common, prominent mottles of yellowish red (5YR 5/6) and light brownish gray (10YR 6/2); weak, medium, subangular blocky structure; friable when moist, slightly hard when dry; extremely acid; gradual, smooth boundary; 10 to 12 inches thick.

C 44 to 60 inches +, variegated yellowish-brown, red, and gray fine sandy loam that contains thin strata of sandy clay loam; weak, medium, angular blocky structure; friable when moist, slightly hard when dry; extremely acid.

Undisturbed areas of this soil have an A_1 horizon that is 2 to 3 inches thick and a lighter colored A_2 horizon that is 8 to 12 inches thick. In a few areas where this soil is transitional to a Savannah soil, the B_3 horizon contains a few small, hard concretions and pockets of gray silt or very fine sand. A few small areas of Pheba soils are included.

These soils are suited to a fairly wide range of crops. When they are cultivated, erosion is a hazard. More than 70 percent of the acreage is now wooded. (Capability unit IIIe-4; woodland suitability group 5.)

Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded (Sb).—The soils in this mapping unit have thinner A horizons than the soils in Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, and they also have a few shallow gullies. In most places the A_p horizon is 4 to 6 inches thick, but in small areas the B horizon is exposed or is mixed with the A horizon in plowing. Small shallow gullies are common, especially where the soils occupy foot slopes and have received runoff from higher areas.

These soils are suited to a fairly wide range of crops. Erosion is a hazard if they are cultivated. (Capability unit IIIe-4; woodland suitability group 5.)

Sawyer Series

The soils of the Sawyer series are moderately well drained, slightly acid to very strongly acid, and low in fertility. The upper part of the subsoil is yellowish brown or brownish yellow, and the lower part is mottled yellowish brown, red, and pale brown or gray. The subsoil is underlain by very slowly permeable, plastic silty clay or clay that is similar in color to the lower subsoil.

These soils formed on gently sloping uplands from Coastal Plain clay and silty clay. They are not extensive, but the areas are rather widely scattered.

The Sawyer soils are associated chiefly with the Boswell, Shubuta, Savannah, and Bowie soils. They are less red than the Boswell soils, and the upper part of their subsoil is more permeable. They are less red than the Shubuta soils, and their parent material was more clayey. They are similar in color to the Savannah soils, but they are finer textured and they do not have the fragipan that is typical of Savannah soils. They are less permeable, finer textured, and more mottled than the Bowie soils.

The native vegetation was a mixed forest of upland hardwoods, loblolly pine, and shortleaf pine. Post oak was a prominent species. Only a few acres are now cultivated. Most areas are in woodland or pasture.

Sawyer fine sandy loam, 1 to 5 percent slopes, eroded (Sd).—This is a moderately well drained, very slowly permeable soil on gently sloping uplands. A profile in a moist area formerly cultivated but now in young pine trees:

A_p 0 to 7 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; numerous roots of grass and pine; medium acid; clear, smooth boundary; 6 to 8 inches thick.

B_1 7 to 14 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, medium, faint mottles of brown (10YR 5/3); weak, medium, subangular blocky structure; friable; numerous roots of grass and pine; strongly acid; clear, smooth boundary; 5 to 9 inches thick.

B_2 14 to 28 inches, yellowish-brown (10YR 5/6) heavy sandy clay or clay; common, medium, prominent mottles of yellowish red (2.5YR 4/6) and few, small, faint mottles of brown (10YR 5/3); moderate, medium, subangular blocky structure; thin, incomplete clay films on both vertical and horizontal structural faces; firm when moist, moderately plastic when wet, hard when dry; numerous roots, mostly of pine; strongly acid; gradual, smooth boundary; 12 to 16 inches thick.

B_3 28 to 33 inches, pale-brown (10YR 6/3) silty clay; many, medium mottles of yellowish brown (10YR 5/4) and red (2.5YR 4/6); moderate, medium, subangular blocky structure; very firm when moist, hard when dry, moderately plastic when wet; incomplete clay films are common, mostly on vertical structural faces; very strongly acid; clear, wavy boundary; 4 to 8 inches thick.

C_1 33 to 46 inches, light brownish-gray (10YR 6/2) silty clay; common, medium, prominent mottles of red (2.5YR 4/6) and yellowish brown (10YR 5/4); moderate, medium, angular blocky structure; very firm when moist, very hard when dry, plastic when wet; very strongly acid; clear, smooth boundary; 11 to 15 inches thick.

C_2 46 to 55 inches +, gray (10YR 6/1) clay; many, small, prominent mottles of red (2.5YR 4/6) and few, distinct mottles of yellowish brown (10YR 5/4); weak, medium, angular blocky structure that breaks down into moderate to strong, very fine, angular blocky structure; very firm when moist, very plastic when wet, very hard but crumbly when dry; very strongly acid.

The color of the A_p horizon ranges from dark brown (10YR 4/3) to grayish brown (10YR 5/2), and its thickness ranges from 3 to about 8 inches. In some places, instead of the B_1 horizon, the profile has an A_3 horizon of yellowish-brown or brownish-yellow fine sandy loam or very fine sandy loam. The mottles in the B_1 and B_2 horizons range from few and faint to common and prominent. The depth to the mottled, gray and red, very slowly permeable C horizon ranges from 30 to 44 inches. The texture of the C horizon is clay or silty clay.

In some small areas this soil is more poorly drained and the profile is distinctly mottled below a depth of about 10 inches. Sandy mounds that have thick A_2 and B_1 horizons occupy from 10 to 15 percent of the surface in many areas, especially where the soil is nearly level.

This soil is fairly well suited to most of the common cultivated crops, provided that erosion is adequately controlled and the fertility level is built up. It is fairly well suited to improved pasture. About 75 percent is in woodland, and 15 percent is in pasture. About 10 percent is former cropland that is now idle. It supports a cover of weeds, native grasses, and scattered pine and sweetgum trees. (Capability unit IIIe-5; woodland suitability group 7.)

Sawyer fine sandy loam, 1 to 5 percent slopes (Sc).—The surface layer of this soil is thicker than that of Sawyer fine sandy loam, 1 to 5 percent slopes, eroded, but in other characteristics the profiles of the two soils are similar. The A horizon in this soil is commonly 9 to 12 inches thick.

This soil is suitable for about the same crops as the eroded phase, and it is used in generally the same way. Yields of cultivated crops are slightly higher under average management. About half of this soil has never been cultivated. (Capability unit IIIe-5; woodland suitability group 7.)

Shubuta Series

The soils of the Shubuta series are moderately well drained to well drained, medium acid to extremely acid, and slowly permeable. They have a thin, sandy surface layer and a subsoil of red sandy clay. The lower part of the subsoil is mottled with gray and yellowish brown.

These are the most extensive and widely distributed soils on the uplands of this parish. They formed from thinly bedded clay, sandy clay, silt, and fine sand.

The Shubuta soils are commonly associated with soils of the Boswell, Cuthbert, Kirvin, and Luverne series and with the hard substratum phases of the Ruston series. They most closely resemble the Boswell, Kirvin, and Cuthbert soils. The Shubuta soils have a slightly coarser textured and less plastic B horizon and a coarser textured C horizon than the Boswell soils. They are finer textured, less friable, and more mottled than the Kirvin soils. The B horizon of the Shubuta soils is thicker and more uniform in color than that of the Cuthbert soils.

The native vegetation was a mixed forest of upland hardwoods, shortleaf pine, and loblolly pine. Most areas where the slope is less than 16 percent have been cultivated in the past but have returned to forest or are idle. At present, about 70 percent of the acreage is in woodland, 20 percent is used for pasture, 5 percent is cultivated, and 5 percent is idle.

Shubuta fine sandy loam, 1 to 5 percent slopes, eroded (Sf).—This is a moderately well drained to well drained, acid, slowly permeable soil on gently sloping rounded hilltops or ridges on the uplands. A typical profile in a moist area formerly cultivated but now wooded:

A_p 0 to 4 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, granular structure; very friable; many fine roots; a few pieces of ironstone gravel; medium acid; clear, smooth boundary; 3 to 5 inches thick.

A_{p2} 4 to 6 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; a few pieces of ironstone gravel; medium acid; abrupt, smooth boundary; 2 to 3 inches thick.

B_{21} 6 to 18 inches, red (2.5YR 4/8) heavy sandy clay; strong, fine, subangular blocky structure; almost complete clay films on structural faces; firm when moist, hard when dry, moderately plastic when wet; very strongly acid; gradual, wavy boundary; 10 to 14 inches thick.

B_{22} 18 to 25 inches, red (2.5YR 4/8) heavy sandy clay; common, fine, prominent mottles of light gray (10YR 7/2) and few, medium mottles of brownish yellow (10YR 6/6); moderate, medium and coarse, subangular blocky structure; incomplete clay films on structural faces; firm when moist, hard when dry, moderately plastic when wet; very strongly acid; gradual, wavy boundary; 4 to 9 inches thick.

B_3 25 to 30 inches, red (2.5YR 4/8) sandy clay; common, medium, prominent mottles of light gray (10YR 7/2) and fine, common, distinct mottles of yellowish red (5YR 5/8); weak, medium, platy structure; firm when moist, slightly hard when dry, slightly plastic when wet; extremely acid; clear, smooth boundary; 3 to 7 inches thick.

C_1 30 to 40 inches, thinly stratified red (2.5YR 4/8) sandy clay, light-gray (10YR 7/2) clay, and red (10YR 4/8) very fine sand; moderate, medium, platy structure; friable; slightly hard when dry; extremely acid; abrupt, smooth boundary; 8 to 12 inches thick.

C_2 40 to 60 inches, yellowish-red (5YR 5/8) very fine sandy loam; thin lenses of light-gray (10YR 7/2) clay; massive; very friable when moist, hard when dry; extremely acid.

In some areas the A_p or A_1 horizon is dark brown. The profile in some places has no A_3 horizon. The amount of ironstone ranges from a few fragments to as much as 10 or 15 percent of the soil volume. In a few places, thin platelike fragments of ironstone are present in the B_3 and C horizons. The base color of the B horizon ranges from yellowish red to dark red. The texture of the B horizon is most commonly sandy clay, but in some places it is silty clay or clay.

This soil is low in natural fertility and low in organic-matter content. Permeability is slow. Most areas have spots where only an inch or two of the A horizon remains. Shallow gullies are fairly common.

This soil is fairly well suited to the common cultivated and forage crops, but it requires intensive control of erosion and improvement of fertility. About 10 percent of the area is now cultivated, 35 percent is in pasture, and 55 percent is wooded. (Capability unit IIIe-4; woodland suitability group 5.)

Shubuta fine sandy loam, 1 to 5 percent slopes (Se).—The A horizon of this soil is thicker than that of Shubuta fine sandy loam, 1 to 5 percent slopes, eroded, but other important profile characteristics are the same. The use of this soil and the crops to which it is suited are similar to those of the eroded phase. Yields of cultivated crops are usually slightly higher. A small percentage of this soil has never been cultivated. (Capability unit IIIe-4; woodland suitability group 5.)

Shubuta fine sandy loam, 5 to 8 percent slopes, eroded (Sh).—The profile of this soil is similar to that of Shubuta fine sandy loam, 1 to 5 percent slopes, eroded. This soil is not suited to continuous cultivation, but it can be used for small grain or sod crops. It is fairly well suited to pasture. At present, about 75 percent of the area is in woodland, 20 percent is in pasture, and 5 percent is in cropland. Much of the cropland is idle. (Capability unit IVe-1; woodland suitability group 5.)

Shubuta fine sandy loam, 5 to 8 percent slopes (Sg).—The dark-brown or dark grayish-brown A_1 horizon of this soil is 2 to 3 inches thick. It is underlain by a lighter colored A_2 horizon that is 8 to 10 inches thick. In other important characteristics, the profile is similar to that of Shubuta fine sandy loam, 1 to 5 percent slopes, eroded.

This soil is not suited to continuous cultivation. It can be used for small grain, or it can be cultivated for 1 or 2 years in rotation with several years of close-growing or sod crops. Most of the acreage is in woodland that has never been cleared. (Capability unit IVe-1; woodland suitability group 5.)

Shubuta fine sandy loam, 8 to 16 percent slopes, eroded (Sk).—This soil has a profile similar to that of Shubuta fine sandy loam, 1 to 5 percent slopes, eroded, except that the A_p horizon is generally thinner. Over small areas, the B horizon is exposed or has been mixed into the plow layer. Small gullies are common. In most places a few larger gullies have penetrated the B horizon.

This soil is not suited to cultivated crops because of the severe hazard of erosion. It is fairly well suited to permanent pasture. About 85 percent is in woodland, and 15 percent is used for pasture. (Capability unit VIe-1; woodland suitability group 5.)

Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded (Sn).—This soil contains greater amounts of ironstone fragments and concretions than Shubuta fine sandy loam, 1 to 5 percent slopes, eroded; otherwise, the profiles are somewhat similar.

Normally the largest amounts of ironstone are in the A horizon. In most places from 15 to 30 percent of the A horizon consists of hard concretions and angular fragments of ironstone up to 3 inches in diameter. In some small areas the ironstone fragments and concretions make up as much as 50 percent of the volume. From 10 to 20 percent of the B horizon commonly consists of ironstone gravel, but in some small areas the proportion may be as much as 30 to 50 percent.

This mapping unit includes small areas in which ironstone gravel makes up less than 15 percent of the A horizon. A few small areas of Kirvin gravelly fine sandy loam are also included.

This soil is fairly well suited to the common cultivated crops and pasture plants. About 80 percent is in woodland, 15 percent is in pasture, and 5 percent is under cultivation. (Capability unit IIIe-4; woodland suitability group 9.)

Shubuta gravelly fine sandy loam, 1 to 5 percent slopes (Sm).—The A horizon of this soil is 10 to 14 inches thick; it is thicker than that of Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded. The profiles are otherwise similar. Little erosion has taken place.

This soil is suited to the same crops as the eroded phase, but yields of cultivated crops are usually slightly higher. Most areas have not been cleared. About 90 percent of the soil is in woodland, 8 percent is used for pasture, and 2 percent is cultivated. (Capability unit IIIe-4; woodland suitability group 9.)

Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded (Sp).—This soil is similar in profile characteristics to Shubuta fine sandy loam, 1 to 5 percent slopes, eroded, except that it contains more gravel.

This gravelly, slowly permeable soil is not suited to continuous cultivation because of the severe hazard of erosion. Plowing should be limited to that necessary for broadcast crops or for 1 or 2 years of row crops in rotation with several years of close-growing or sod crops. This soil is fairly well suited to most of the common pasture plants. About 80 percent of the acreage is in woodland, 15 percent is used for pasture, and 5 percent is idle cropland. (Capability unit IVe-1; woodland suitability group 9.)

Shubuta gravelly fine sandy loam, 5 to 8 percent slopes (So).—Except for the A horizon, the profile of this soil is like that of Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded. In most places the A horizon is 10 to 14 inches thick. Where it is undisturbed, it consists of a dark-brown to dark grayish-brown A_1 horizon that is 2 to 3 inches thick and a brown to light yellowish-brown A_2 horizon that is 8 to 12 inches thick.

This soil is not well suited to continuous cultivation, but it is fairly well suited to broadcast crops, small grain, and most of the common pasture plants. It is fairly well suited to loblolly pine and shortleaf pine. Most areas are now in woodland. (Capability unit IVe-1; woodland suitability group 9.)

Shubuta gravelly fine sandy loam, 8 to 20 percent slopes (Sr).—This is a gravelly, slowly permeable, strongly sloping to very strongly sloping soil on the uplands. The profile is similar to that of Shubuta fine sandy loam, 1 to 5 percent slopes, eroded, except for the A horizon. In most places the A horizon is clearly expressed and is from

10 to 12 inches in thickness. From 15 to 30 percent of the A horizon consists of ironstone gravel. Some small areas are moderately eroded.

This soil is not suited to cultivation because of the very severe hazard of erosion. The less sloping areas are fairly well suited to permanent pasture if an adequate cover of vegetation is maintained and the soil is plowed very infrequently. Most areas are best suited to woodland. About 95 percent of this soil is in woodland, and 5 percent is in pasture. Most of it has never been cultivated. (Capability unit VIe–1; woodland suitability group 9.)

Shubuta soils, 5 to 30 percent slopes, severely eroded (Ss).—This mapping unit consists of small areas of Shubuta soils, the surface layer of which ranges in texture from gravelly fine sandy loam to sandy clay. In some areas, erosion has removed all of the A horizon and part of the B horizon. In other places, several inches of the A horizon remain, but many large gullies have penetrated the B horizon.

These soils are unsuited to any use except woodland. Their fertility level is very low. Most areas are covered by a thick to sparse stand of pine trees. A few almost bare areas support a thin stand of weeds, broomsedge, and blackberry vines. (Capability unit VIIe–2; woodland suitability group 9.)

Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded (St).—About 60 percent of this mapping unit consists of Shubuta gravelly fine sandy loam on narrow ridges and the upper parts of slopes. About 40 percent is Boswell gravelly fine sandy loam or Boswell fine sandy loam on the middle or lower part of the slopes. A typical Shubuta soil is described on page 46, and a typical Boswell soil is described on page 18.

These soils are strongly sloping to very strongly sloping. They are not suited to cultivated crops, and they are poorly suited to pasture. All of the acreage is in woodland. (Capability unit VIIe–2; woodland suitability group 9.)

Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes (Su).—Some areas of this mapping unit consist only of Shubuta gravelly fine sandy loam. Others consist of Shubuta gravelly sandy loam on the smoother, less strongly sloping areas and upper parts of slopes, and Cuthbert gravelly sandy loam on very narrow ridges, very strong short slopes, and the lower parts of strong slopes. These soils are mapped together because of similarities in the characteristics that affect use and management.

These soils contain various amounts of gravel. From 15 to 30 percent of the A horizon consists of gravel, but the amounts in the B and C horizons are smaller. In many places the soil contains a few scattered angular or rounded fragments of ironstone up to 6 or 8 inches in diameter.

The profile of Shubuta gravelly fine sandy loam does not differ significantly from that of Shubuta soils on smoother, less sloping areas. The B horizon is thinner; in some places it is between 12 and 18 inches in thickness.

A profile of Cuthbert gravelly sandy loam in a mixed woodland of hardwoods and shortleaf pine, taken while the soil was moist:

A_{00} 2 inches to ½ inch, undecomposed oak leaves and pine needles.

A_0 ½ inch to 0, dark-gray, partly decomposed leaves.

A_1 0 to 3 inches, grayish-brown (2.5Y 5/2) gravelly sandy loam, about 20 percent of which consists of dark-brown, rounded to angular, hard fragments of ironstone ½ to 2 inches in diameter; weak, fine, crumb structure; very friable; many fine fibrous roots; strongly acid; clear, smooth boundary; 2 to 4 inches thick.

A_2 3 to 9 inches, light yellowish-brown (10YR 6/4) fine sandy loam, of which about 15 percent consists of hard fragments of ironstone, mostly less than 1 inch in diameter; weak, fine, subangular blocky structure; very friable; abundant fine roots; very strongly acid; abrupt, wavy boundary; 5 to 8 inches thick.

B_2 9 to 13 inches, yellowish-red (5YR 4/6) heavy sandy clay; common, distinct mottles of strong brown (7.5YR 5/6); weak, medium, irregular blocky structure; very firm when moist, very hard when dry, moderately plastic when wet; a few ironstone fragments coated with clay; fine and medium roots common; extremely acid; clear, wavy boundary; 3 to 6 inches thick.

B_3 13 to 18 inches, variegated strong-brown (7.5YR 5/6), pale-brown (10YR 6/3), and yellowish-red (5YR 4/6) sandy clay loam that has pockets of sandy clay; moderate, medium, subangular blocky structure; firm when moist, hard when dry; roots, mostly medium sized, are common; extremely acid; clear, wavy boundary; 4 to 8 inches thick.

C_1 18 to 30 inches, strong-brown (7.5YR 4/6), brownish-yellow (10YR 6/8), and light brownish-gray (2.5Y 6/2) sandy clay that contains strata of sandy clay loam; weak, medium to thick, platy structure; friable to firm when moist, hard when dry; a few large roots; extremely acid; abrupt, smooth boundary; 10 to 14 inches thick.

C_2 30 to 36 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam that has pockets and splotches of brownish yellow (10YR 6/8); massive; friable when moist, slightly hard when dry; 1 or 2 platy, thin, iron crusts; a few roots; extremely acid.

These soils are not suited to cultivation. They are poorly suited to pasture. All of the area is in woodland. (Capability unit VIIe–2; woodland suitability group 9.)

Stough Series

The soils of the Stough series are somewhat poorly drained, medium acid to extremely acid, and slowly permeable. They have a moderately developed fragipan in the lower part of the subsoil.

These soils lie on flat to gently sloping terraces of streams. They formed from old alluvium derived largely from red beds in western Oklahoma and Texas. The largest areas of these soils are near Bellevue, and there are other areas in the eastern part of the parish.

The Stough soils are associated chiefly with the Wrightsville, Myatt, and Prentiss soils. They have better drainage than the Wrightsville and Myatt soils and a coarser textured subsoil than the Wrightsville soils. They are less well drained than the Prentiss soils.

The native vegetation was a mixed forest that consisted chiefly of hardwood trees and some loblolly pine. Most of the soils are now used for woodland. A few areas that are closely associated with better drained soils have been cleared for cultivation, but most of these have returned to woodland or are used for pasture.

Stough silt loam, clay substratum, 0 to 1 percent slopes (Sx).—This is a somewhat poorly drained, slowly permeable soil that has a fragipan. A typical profile in a moist woodland of oak and pine:

A_{00} 1¼ inches to ¼ inch, undecomposed oak leaves and pine needles.

A_0 ¼ inch to 0, dark-gray, partly decomposed leaves and twigs.

A_1 0 to 1 inch, grayish-brown (10YR 5/2) silt loam; weak to moderate, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary; 1 to 2 inches thick.

A_{2g} 1 to 9 inches, light brownish-gray (10YR 6/2) silt loam; many, small and medium, distinct mottles of yellowish brown (10YR 5/6) and brown stains around fine roots; massive (structureless) to weak, medium, granular structure; friable; numerous small pores; numerous roots; numerous small, hard concretions that have a black interior; very strongly acid; clear, smooth boundary; 7 to 10 inches thick.

B_{1g} 9 to 14 inches, light brownish-gray (10YR 6/2) heavy silt loam or light silty clay loam; many, small and medium, distinct mottles of yellowish brown (10YR 5/6) and few, prominent mottles of strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable when moist, slightly hard when dry, sticky when wet; numerous fine and medium-sized roots; scattered, small and medium, brown concretions; very strongly acid; clear, smooth boundary; 4 to 6 inches thick.

B_{2g} 14 to 26 inches, silty clay loam, about equally mottled with light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6); a few yellowish-brown stains around roots; compound moderate, coarse, subangular blocky structure that breaks down to weak, fine, subangular blocky structure; friable; a few roots; a few soft to hard, small, dark-brown concretions; extremely acid; clear, smooth boundary; 9 to 11 inches thick.

B_{3mg} 26 to 36 inches, light brownish-gray (10YR 6/2) silt loam, about 30 percent of which is mottles of yellowish brown (10YR 5/6); a few pockets of light-gray silt (2.5Y 7/2); massive; friable when moist, hard and brittle when dry; very few roots; many small concretions that have a black interior; very strongly acid; abrupt, smooth boundary; 9 to 12 inches thick.

D or B_b 36 to 44 inches +, dark-gray (10YR 4/1) clay; many, fine and medium mottles of red (2.5YR 4/8); massive (structureless) in place when moist, when displaced has weak to moderate, medium, angular blocky structure; numerous thick coatings of light-gray silt (10YR 7/2) on structural faces; very firm when moist, very hard when dry, plastic when wet; very strongly acid.

In some profiles, the A and B horizons are silt loam and differ little in texture to a depth of about 36 to 40 inches. The depth to the clay substratum ranges from 30 to 44 inches. In some places the substratum consists of mottled gray and yellowish-brown silty clay.

Many areas have a few low, sandy mounds. The texture of the upper part of the mounds normally is very fine sandy loam to a depth of about 30 inches. The colors of the soil in the mounds range from reddish yellow through yellowish brown to pale brown. Faint to distinct mottles are commonly present at a depth of more than 30 inches.

In some minor areas there is no clay substratum in the profile. Some small areas of Wrightsville silt loam and Prentiss silt loam are also included.

This soil is fairly well suited to small grain, annual lespedeza, and those pasture plants that do not require a well-drained soil. It is poorly suited to the common cultivated crops. It is well suited to loblolly pine and is used principally for woodland. A few areas that have been cleared are in pasture. Very little is cultivated. (Capability unit IIw-3; woodland suitability group 3.)

Stough silt loam, clay substratum, 1 to 3 percent slopes (Sy).—The profile of this soil is very similar to that of Stough silt loam, clay substratum, 0 to 1 percent slopes, but this soil has better surface drainage. It is well suited to loblolly pine and is used mostly for woodland. It is very inextensive. (Capability unit IIw-3; woodland suitability group 3.)

Stough complex, mounded, 0 to 1 percent slopes (Sv).—Numerous sandy mounds ranging from 30 to 70 feet in diameter and 18 to 36 inches in height occupy from 15 to 30 percent of the area of this mapping unit. The texture of the soil material in the mounds generally is very fine sandy loam to a depth of about 30 inches, and its color ranges from reddish yellow to pale brown. The soil between the mounds is typical Stough silt loam, clay substratum.

These areas are best suited to pasture or woodland. Most of them are now used for woodland. A small acreage is in pasture, and a few small fields of former cropland are idle. (Capability unit IIIw-4; woodland suitability group 3.)

Stough silt loam, 0 to 3 percent slopes (Sw).—The profile of this soil is very similar to that of Stough silt loam, clay substratum, 0 to 1 percent slopes, except that it does not have a fine-textured substratum. In most places the underlying parent material is silt loam or silty clay loam.

This soil occurs in small to medium-sized areas along Cypress Bayou and other small streams. The slope is generally less than 1 percent, but near stream channels there are a few short slopes of as much as 3 percent. About 95 percent of this soil is in woodland and about 5 percent is used for pasture. (Capability unit IIw-3; woodland suitability group 3.)

Susquehanna Series

The soils of the Susquehanna series are moderately well drained, medium acid to extremely acid, and very slowly permeable. They have a thin, grayish-brown, sandy surface layer and a thin, highly mottled, yellowish-red and gray subsoil.

Most of the Susquehanna soils are on strong to very strong slopes on the uplands. The largest areas are on the escarpment along the eastern side of Bodcau Bayou near Bellevue. Some are on more gentle slopes. The parent material was thick beds of acid Coastal Plain clay.

The Susquehanna soils are associated chiefly with the Boswell, Shubuta, and Cuthbert soils. Their B horizon is thinner and more mottled than that of the Boswell soils. Their B horizon is thinner, less permeable, and more mottled than that of the Shubuta soils, and their C horizon is finer textured and more plastic. Both the B and C horizons are more plastic and more clayey than those of the Cuthbert soils.

The native vegetation was a mixed woodland of upland hardwoods, shortleaf pine, and loblolly pine. A few small areas have been cleared and cultivated, but most of these have returned to woodland. A few acres are used for pasture.

Susquehanna soils, 8 to 30 percent slopes, eroded (Saa).—A profile on a moist, wooded, 12 percent slope:

A_{00} 1¼ inches to ¼ inch, undecomposed hardwood leaves.

A_0 ¼ inch to 0, dark-gray, partly decomposed leaves and twigs.

A_1 0 to 2 inches, very dark grayish-brown (10YR 3/2) very fine sandy loam; weak, fine, crumb structure; very friable; medium acid; abundant roots; abrupt, smooth boundary; 1 to 3 inches thick.

A_2 2 to 5 inches, light grayish-brown (10YR 6/2) very fine sandy loam; weak, fine, crumb structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary; 2 to 4 inches thick.

B_2 5 to 9 inches, yellowish-red (5YR 4/6) clay; many, medium, prominent mottles of light olive brown (2.5Y 5/4); moderate, medium, subangular blocky structure;

a few dark-red clay films on structural faces; very firm when moist, very hard when dry, plastic when wet; fine and medium roots common; very strongly acid; clear, smooth boundary; 3 to 5 inches thick.

B_3 9 to 16 inches, light brownish-gray (2.5Y 6/2) clay; many, medium, prominent mottles of dark red (2.5YR 3/6); weak to moderate, fine and very fine, angular blocky structure; firm when moist, very plastic when wet, crumbly when dry; fine roots common; very strongly acid; clear, slightly wavy boundary; 6 to 8 inches thick.

C 16 to 30 inches, light brownish-gray (2.5Y 6/2) clay, of which 30 percent consists of dark-red (10R 3/6), medium mottles; massive in place, but when dry crumbles into a mass of very fine, angular or rounded blocks; very firm when moist, very plastic when wet; a few roots; extremely acid.

The surface layer varies in texture. It is most commonly fine sandy loam, very fine sandy loam, or silt loam. The B horizon varies in thickness and in color. The base color ranges from strong brown to dark red. The B_2 horizon is thickest and most conspicuous where these soils are associated with the Boswell soils.

Runoff is very rapid, and infiltration is slow. Erosion causes considerable loss of soil material when the surface is left, even for short periods, without protective cover. Although almost none of the acreage has been cultivated, a large part of it shows definite effects of erosion. Small stabilized gullies are present, the A horizon is very thin in some spots, and a few small areas have a surface layer of clay or sandy clay. The probable causes of the past erosion were the removal of the forest cover during logging operations and the periodic destruction of cover by fire.

These soils are suited only to woodland. (Capability unit VIIe-2; woodland suitability group 10.)

Susquehanna soils, 5 to 30 percent slopes, severely eroded (Sab).—The profiles of the soils in this mapping unit vary. The B or C horizon is exposed in most places, and only small spots of the A horizon remain. Large gullies are common.

These soils are suited only to woodland. Most areas have been denuded of forest cover by logging operations or by fire or both. A few areas were cleared and cultivated, then abandoned because of erosion. (Capability unit VIIe-2; woodland suitability group 10.)

Susquehanna fine sandy loam, 1 to 8 percent slopes (Sz).—The A horizon of this soil is 7 to 10 inches thick and is not eroded. In other respects, the profile closely resembles the one described for Susquehanna soils, 8 to 30 percent slopes, eroded. Most of this soil is on rather narrow ridgetops, but some is on foot slopes.

This inextensive soil is fairly well suited to permanent pasture or woodland, but it is not suited to cultivated crops. Nearly all of it is presently in woodland. (Capability unit VIe-2; woodland suitability group 10.)

Tilden Series

The soils of the Tilden series are moderately well drained, medium acid to extremely acid, and moderately slow in permeability. The surface layer is brown to grayish brown. The upper part of the subsoil is strong brown to yellowish red and more clayey than the surface layer. The lower part contains a fragipan that formed in mottled yellow, brown, and gray silty clay loam or heavy silt loam.

These soils are on broad, nearly level to moderately sloping stream terraces, chiefly in the eastern part of the parish. They formed from old, stratified alluvium. In most areas they are underlain at a depth of several feet by reddish, mildly alkaline to moderately alkaline sediments that came from red beds. The Tilden soils in a few small areas along local streams in the north-central part of the parish, where the underlying sediments are not reddish, evidently formed from sediments washed from the uplands nearby.

The Tilden soils are associated chiefly with the Cahaba, Prentiss, and Wrightsville soils. They differ from the Cahaba soils mainly in having a slowly permeable fragipan in the lower part of the subsoil. They are more brown or red than the yellowish-brown Prentiss soils. They are much better drained, more permeable, and coarser textured than the Wrightsville soils.

The natural vegetation was a mixed forest of loblolly pine, shortleaf pine, and hardwoods, principally oaks, hickory, and gum. Except for areas that are severely eroded, these soils are fairly well suited to the common cultivated crops and pasture plants. They are responsive to good management. They are well suited to pine woodland.

Nearly all of the larger areas have been cleared and cultivated in the past. Many areas have returned to woodland or are used for pasture. At present, about 15 percent of the acreage is cultivated land, 40 percent is pasture, 30 percent is woodland, and 15 percent is idle land that supports only weeds and broomsedge.

Tilden very fine sandy loam, 1 to 5 percent slopes, eroded (Tv).—This is a moderately well drained soil that has moderately slow permeability. A profile in an improved pasture that was formerly cultivated, taken while the soil was moist:

A_p 0 to 5 inches, brown (10YR 5/3) very fine sandy loam; weak, medium, granular structure; very friable; common, small, soft to hard, dark concretions; numerous roots; medium acid; abrupt, smooth boundary; 4 to 6 inches thick.

B_{21} 5 to 11 inches, yellowish-red (5YR 4/6) clay loam; weak, medium, subangular blocky structure; thin, patchy clay films on blocks; friable; many roots; very strongly acid; clear, smooth boundary; 5 to 7 inches thick.

B_{22} 11 to 17 inches, yellowish-red (5YR 4/8) clay loam; weak, medium, subangular blocky structure; thin, patchy clay films on blocks; friable; many roots; extremely acid; clear, smooth boundary; 5 to 7 inches thick.

B_{23} 17 to 25 inches, yellowish-brown (10YR 5/4) silty clay loam; very faint mottles of yellowish red; weak, medium, angular blocky structure; friable; few roots; common, soft to hard, dark concretions; extremely acid; clear, smooth boundary; 7 to 9 inches thick.

B_3 25 to 33 inches, light yellowish-brown (10YR 6/4) loam; many, medium, prominent, brown (7.5YR 5/6) mottles; strong, coarse, angular blocky structure that breaks into moderate, medium, subangular blocky structure; firm; a few small, soft to hard, dark concretions; extremely acid; abrupt, wavy boundary; 7 to 10 inches thick.

B_{3mg} 33 to 44 inches, light-gray (10YR 7/2) silty clay loam; common, medium and large, distinct, brownish-yellow (10YR 6/6) mottles; weak, coarse, prismatic structure that breaks down into weak, medium, subangular blocky structure; very firm when moist, very hard when dry; many medium, soft to hard, dark concretions; extremely acid; abrupt, wavy boundary; 10 to 20 inches thick.

D_g 44 to 54 inches, light-gray (2.5YR 7/2) clay; medium, prominent, yellowish-red (5YR 4/6) mottles; weak, coarse, prismatic structure that breaks into strong, very fine, angular blocky structure; films of very fine sand between prisms; very firm when moist, very hard when dry; extremely acid.

The principal variation is in the thickness and hardness of the fragipan. The depth to the fragipan ranges from about 28 to 36 inches. In some areas, instead of a D horizon, the profile contains a C horizon of sandy loam, loam, or silty clay loam. In some places where there is no D horizon, the fragipan is 2 feet or more in thickness. The color of the B_2 horizon ranges from strong brown (7.5YR 5/6) to yellowish red (5YR 5/8). The lower part of the B_2 horizon is in some places unmottled or faintly mottled.

In many places there are a few sandy mounds that cover less than 15 percent of the surface. They have a thick A horizon. The soil in the mounds resembles the Cahaba soils, except that it has no distinct B horizon.

A few small areas have slopes of 6 to 8 percent. Small areas of Cahaba and Prentiss soils are also included.

This soil is fairly well suited to the common cultivated crops, small grain, and pasture plants. All of it has been cultivated in the past. At present, about 30 percent is cultivated, much of it intermittently. About 40 percent is used for pasture, and 30 percent is in woodland (Capability unit IIe-3; woodland suitability group 2.)

Tilden very fine sandy loam, 1 to 5 percent slopes (Ts).—The surface layer of this soil has not been materially affected by erosion. The A horizon is 8 to 14 inches thick. In other respects, this soil is like Tilden very fine sandy loam, 1 to 5 percent slopes, eroded. It is suited to the same crops and is used in the same way. Yields of cultivated crops are usually slightly higher on this soil. (Capability unit IIe-3; woodland suitability group 2.)

Tilden very fine sandy loam, 0 to 1 percent slopes (Tf).—The profile of this soil is similar to that of Tilden very fine sandy loam, 1 to 5 percent slopes, eroded, except that the A horizon is 10 to 14 inches thick.

This soil is well suited to most of the common cultivated crops. It has low natural fertility, but it is responsive to good management. This is a very inextensive soil. All of it has been cultivated in the past, but most of it is now idle or in pasture, along with the more sloping soils that surround it. (Capability unit I-3; woodland suitability group 2.)

Tilden soils, 1 to 8 percent slopes, severely eroded (Td).—These soils occur in small areas among areas of less eroded Tilden soils. In some places the B horizon is exposed, and the texture of the surface layer ranges from sandy clay loam to very fine sandy loam within short distances. Numerous shallow gullies have penetrated the upper part of the B horizon.

These soils are not suited to cultivation. Most of them are poorly suited to pasture. Woodland is the best use. (Capability unit VIIe-1; woodland suitability group 2.)

Vaucluse Series

The soils of the Vaucluse series are moderately well drained, slightly acid to very strongly acid, and slowly permeable. Their surface layer is grayish brown to dark gray and sandy. The subsoil is brittle, hard sandy clay or sandy clay loam mottled with red and brown.

These soils occur principally west and southwest of Plain Dealing and to a lesser extent on the uplands east of Benton. They are on gentle to strong slopes on the uplands.

The Vaucluse soils are associated chiefly with the Lakeland, Shubuta, and Ruston soils. They are generally in the transition area between Lakeland soils and those that formed in more clayey parent material. They have a finer textured subsoil than the Lakeland soils, and their permeability is less rapid. The upper part of their subsoil is more mottled than that of the Shubuta soils, and the material beneath is coarser. The Vaucluse soils have a more mottled, less permeable subsoil that is hard when dry, but the Ruston soils have an unmottled subsoil that is only slightly hard when dry.

The native vegetation was largely shortleaf pine and hardwoods, including red oak, hickory, and blackjack oak. Most areas are in woodland. Nearly all of the areas that were formerly cultivated have returned to woodland or are now reseeding to pine.

Vaucluse loamy fine sand, 1 to 5 percent slopes (Va).—This is a medium acid to very strongly acid, slowly permeable soil on gently sloping uplands. A profile in moist pine woodland:

A_1 0 to 3 inches, dark-gray (10YR 4/1) loamy fine sand that contains many clear, unstained sand grains, weak, medium, crumb structure; very friable when moist, loose when dry; medium acid; abundant fine and medium roots; clear, wavy boundary; 3 to 4 inches thick.

A_2 3 to 18 inches, pale-brown (10YR 6/3) loamy fine sand; weak, medium, crumb structure; numerous fine and medium roots; clear, smooth boundary; 12 to 17 inches thick.

B_1 18 to 21 inches, yellowish-red (5YR 4/6) sandy clay loam; few, fine, distinct mottles of strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable when moist, slightly hard and brittle when dry; numerous fine roots; strongly acid; clear, smooth boundary; 2 to 4 inches thick.

B_2 21 to 31 inches, variegated dark-red (10R 3/6) and strong-brown (7.5YR 5/6) sandy clay; moderate, medium, subangular blocky structure; thin patchy clay films on all vertical and a few horizontal structural faces; friable to slightly firm when moist, very hard and brittle when dry; a few fine roots; very strongly acid; gradual, smooth boundary; 8 to 12 inches thick.

C 31 to 42 inches +, variegated dark-red (10R 3/6), strong-brown (7.5YR 5/6), and light-gray (10YR 7/2) fine sandy loam; coarse, reticulate mottling; weak, coarse, irregular blocky structure; friable when moist, slightly hard when dry; very strongly acid.

The A horizon is 12 to 26 inches thick. In some places there is no B_1 horizon or only a very thin one. In a few places the A and B horizons are underlain by a D horizon of light-gray silty clay mottled with brown and red, which is commonly at a depth of about 50 to 60 inches. A few small areas of Ruston fine sandy loam, hard substratum, are included in this mapping unit.

This soil is not well suited to the common cultivated crops, because it has a low available-moisture capacity and low fertility. The loose, coarse-textured surface layer is very susceptible to gullying. Probably it can best be used for deep-rooted grasses or for pine trees. None of it is cultivated at present. (Capability unit IIIe-4; woodland suitability group 5.)

Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded (Vc).—This soil has lost part of its surface layer through erosion; otherwise, it has a profile like that of Vaucluse loamy fine sand, 1 to 5 percent slopes. The A horizon is commonly 8 to 14 inches thick. Numerous small gullies have cut down to or into the B horizon.

This is the most extensive soil in the Vaucluse series. It is not well suited to the common cultivated crops. It is best used for deep-rooted grasses or pine trees. At present, nearly all of it is in woodland. (Capability unit IIIe–4; woodland suitability group 5.)

Vaucluse loamy fine sand, 5 to 8 percent slopes (Vf).—The profile of this soil has about the same characteristics as that of Vaucluse loamy fine sand, 1 to 5 percent slopes. This soil is not suited to continuous cultivation, but it is fairly well suited to use for small grain or deep-rooted pasture plants. Practically all of it is now in woodland. (Capability unit IVe–1; woodland suitability group 5.)

Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded (Vm).—The surface layer of this soil is thinner than that of Vaucluse loamy fine sand, 1 to 5 percent slopes, and shallow gullies are numerous. In other characteristics, the profiles are similar. Probably this soil is best used for deep-rooted grasses or pine trees. All of it is now used for woodland. (Capability unit IVe–1; woodland suitability group 5.)

Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded (Vs).—This soil has a profile like that of Vaucluse loamy fine sand, 1 to 5 percent slopes, except that the surface layer shows the effects of erosion, and shallow gullies are numerous. All of this soil is in woodland, probably its best use. (Capability unit VIe–1; woodland suitability group 5.)

Wrightsville Series

The soils of the Wrightsville series are poorly drained, very slowly permeable, and medium acid to extremely acid. The surface layer is thin and dark colored. The subsurface layers are gray mottled with yellowish brown and strong brown, They rest rather abruptly on the fine-textured, gray subsoil. The subsoil grades into the parent material, which is gray, plastic clay mottled with yellowish red.

This is the most extensive series in Bossier Parish. These soils occupy flat to slightly depressed areas, commonly known as flatwoods, on stream terraces, mostly in the eastern part of the parish. They formed in fine-textured old alluvium that was derived mainly from red beds.

The Wrightsville soils are associated chiefly with the Acadia and Muskogee soils and with the clay substratum phases of the Stough soils. They are more poorly drained than any of these associated soils. They are shallower over clay than the Stough soils, and they do not have a fragipan.

The native vegetation was chiefly water-tolerant hardwood trees, such as willow oak, post oak, and gum. Loblolly pine grew on the ridges and sandy mounds. The understory was hawthorn. Nearly all of these soils are used for woodland. Only a few small areas have been cleared and are used for pasture.

Wrightsville silt loam (Wt).—This is a poorly drained, wet, very slowly permeable soil on stream terraces. The slope is less than 1 percent. A profile in moist woodland:

A_{00} ¾ to ¼ inch, undecomposed oak leaves.

A_0 ¼ inch to 0, very dark gray, partly decomposed oak leaves and twigs.

A_1 0 to 2½ inches, dark-gray (10YR 4/1) silt loam; weak, medium, crumb and granular structure; friable when moist, sticky when wet; many fine and medium roots; strongly acid; abrupt, slightly wavy boundary; 1 to 3 inches thick.

A_{21g} 2½ to 7 inches, gray (10YR 6/1) silt loam; common to many, small, prominent mottles of strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6); weak, medium, subangular blocky structure and coarse, granular structure; friable when moist, slightly hard when dry, sticky when wet; vesicular pores common; numerous fine roots; very strongly acid; clear, smooth boundary; 4 to 6 inches thick.

A_{22g} 7 to 12 inches, gray (10YR 6/1) heavy silt loam; many, medium, prominent mottles of strong brown (7.5YR 5/6); numerous crayfish holes filled with light brownish-gray (10YR 6/2) silt; weak, medium, subangular blocky structure; friable when moist, slightly hard when dry, sticky when wet; fine roots common; very strongly acid; abrupt, wavy boundary; 4 to 6 inches thick.

B_{2g} 12 to 21 inches, grayish-brown (2.5Y 5/2) silty clay; strong-brown (7.5YR 5/6) stains around roots and in cracks; weak, coarse, prismatic structure that breaks down to moderate, coarse, angular blocky structure when dry; very firm when moist, very hard when dry, plastic when wet; light-gray silt in cracks; very strongly acid; gradual, wavy boundary; 8 to 10 inches thick.

C_1 21 to 32 inches +, light brownish-gray (2.5Y 6/2) clay; common, fine, prominent mottles of yellowish red (5YR 5/6); massive (structureless) to weak, coarse, prismatic structure that breaks down when dry to moderate, coarse, irregular blocky structure; extremely acid.

In some places, one or both of the A_2 horizons are silty clay loam rather than silt loam. The colors of the B_2 horizon and C_1 horizon range from gray to grayish brown. The depth to the very slowly permeable silty clay or clay ranges from about 7 to 24 inches, but 10 to 18 inches is considered normal. In most areas there are a few low, sandy, circular to oblong mounds that have an A horizon of very pale brown (10YR 7/3 to 10YR 7/4) very fine sandy loam that is 18 to 30 inches thick over gray and red mottled silty clay.

Included are small areas of poorly drained soils that show little difference in texture between their upper horizons but are underlain at a depth of 36 to 48 inches by gray silty clay or clay. Small areas of Acadia silt loam on low ridges are also included.

This soil is poorly suited to the common cultivated crops because of wetness, poor aeration, and low natural fertility. Where adequate surface drainage has been provided, this soil is fairly well suited to pasture plants that do not require a well-drained soil. (Capability unit IVw–1; woodland suitability group 11.)

Wrightsville complex, mounded (Wr).—This mapping unit consists of typical Wrightsville silt loam, 15 to 30 percent of which is covered by sandy mounds. The general slope is less than 1 percent. Most of the mounds are circular to oval. They range from 1½ to 3½ feet in height and from 30 to 70 feet in diameter. The profile is not uniform from one mound to another nor within the same mound. The thickness of the several layers in the center of the mound differs greatly from the thickness of those layers near the edge of the mound. Colors also vary considerably between individual mounds. Generally, the highest mounds are moderately well drained and have uniform yellow or brown colors. The texture is commonly uniform, or nearly so, to a depth of 24 to 30 inches. Many of the mounds have a profile similar to the following:

A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; moderate, fine, granular structure; very friable; medium acid; clear, smooth boundary.

A_{21} 2 to 20 inches, pale-brown (10YR 6/3) very fine sandy loam; few, small, faint mottles of brownish yellow (10YR 6/6); very weak, medium, granular structure; very friable; strongly acid; clear, smooth boundary.

A_{22} 20 to 32 inches, brownish-yellow (10YR 6/6) very fine sandy loam mottled with light gray (10YR 7/2) and strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable; dark-brown concretions common; very strongly acid; abrupt, wavy boundary.

D 32 to 42 inches+, gray (10YR 5/1) silty clay; many, fine to medium, prominent mottles of yellowish red (5YR 4/6); moderate, medium, angular blocky structure; very firm when moist, medium plastic when wet; extremely acid.

The soil in this complex is poorly suited to the common cultivated crops. It is fairly well suited to pasture plants that do not require a well-drained soil. It is wet natured and has low natural fertility. Nearly all of the acreage is wooded. Loblolly pine grows on the mounds, and willow oak, post oak, and other hardwood trees grow between the mounds. (Capability unit IVw-1; woodland suitability group 11.)

Wrightsville silty clay (Wv).—This is a fine-textured, poorly drained, strongly acid to extremely acid, very slowly permeable soil that occupies level areas and slight depressions on stream terraces. Most areas are large. The main areas of this soil are near the northern boundary of the parish along Louisiana Highway 3, west of Lake Bistineau, and south of Koran.

The profile of this soil is similar to that of Wrightsville silt loam, except that the texture of the A horizon is silty clay in most places. Some areas that have an A horizon of silty clay loam are included. Most profiles become progressively more fine textured with depth. Base saturation percentage normally increases with depth. The B horizon is not as distinct as that in Wrightsville silt loam, because less of the clay in the A horizon has been transferred to the B horizon. Most areas have rather pronounced gilgai, or hogwallow, microrelief.

All of this soil is in woodland, which is probably its best use. (Capability unit IVw-1; woodland suitability group 11.)

Yahola Series [2]

The soils of the Yahola series are well drained, mildly alkaline to moderately alkaline, and calcareous. Most of them are sandy or silty and have a reddish color.

These soils are forming in alluvium deposited on natural levees by the Red River. Most of the parent material came from red beds. These soils are near present or abandoned channels of the river. Most of the acreage is protected from flooding by a system of levees.

The Yahola soils are associated chiefly with the Miller and Roebuck soils. In some places they are associated with the Gallion soils. They are more permeable than the Miller and Roebuck soils, and they do not have the thick layers of clay typical of those series. The Yahola soils formed from alluvium that was younger than the parent material of the Gallion soils, and their base saturation is higher. They do not have the weakly to moderately expressed B horizon that is typical of Gallion soils.

The native vegetation was a mixed forest of bottom-land hardwoods, principally oak, pecan, sweetgum, and cottonwood.

These soils are highly prized for agriculture. They are used mainly for cotton, corn, small grain, hay, and improved pasture.

Yahola silt loam, 0 to 1 percent slopes (Yh).—This is a level, well-drained soil on the Red River bottom lands. It has moderate to moderately slow permeability. A typical profile in a moist, cultivated field:

A_p 0 to 8 inches, dark-brown (7.5YR 4/2 to 7.5YR 4/4) silt loam; moderate, fine, granular structure; friable; moderately alkaline and calcareous; abrupt, smooth boundary; 3 to 9 inches thick.

C_1 8 to 20 inches, reddish-brown (5YR 4/3) silt loam that contains several silty clay loam or silty clay strata 2 to 4 inches thick; weak, medium, granular structure to moderate, medium, angular blocky structure; friable to firm; moderately alkaline and calcareous; abrupt, slightly wavy boundary.

C_2 20 to 40 inches, reddish-brown (5YR 5/4) silt loam or very fine sandy loam; massive (structureless) to weak, fine, granular structure; very friable; moderately alkaline and calcareous.

The number of strata and the thickness of the strata vary. Some profiles contain only one or two thin strata of material finer than silt loam. Others contain one or more strata six to eight inches thick. The texture of the underlying materials is rarely finer than silt loam; a texture of fine sandy loam or very fine sandy loam is common, and in a few places the material is loamy fine sand. The various strata range from light reddish brown to dark reddish brown in color when moist. They are somewhat lighter colored when dry. The coarser textured strata are generally lighter in color than the finer textured strata.

Small areas of Miller silt loam and Yahola very fine sandy loam are included in this mapping unit. They are so intricately associated with Yahola silt loam that it is not practical to separate them.

This soil is well suited to cotton, corn, small grain, and most of the common hay and pasture plants. Most areas are used for cotton, corn, and other cultivated crops. Average yields are moderately high to high. The soil is only fairly well suited to alfalfa and is seldom used for this crop. (Capability unit I-1; not suited to pines but can be used to grow hardwoods.)

Yahola very fine sandy loam, 0 to 1 percent slopes (Yr).—This is a well-drained, medium-textured soil that has moderate permeability. It is coarser textured than Yahola silt loam, 0 to 1 percent slopes, and it contains fewer strata of fine-textured materials. Strata of a texture finer than silt loam rarely appear at a depth of less than about 30 inches. At a depth greater than 30 inches, one or two thin strata of silty clay loam are common. This soil is more rapidly permeable than most areas of Yahola silt loam.

This soil is well suited to cotton, corn, small grain, and the common hay and pasture plants. Most areas are used for cotton or corn. A few acres are in hay or pasture. (Capability unit I–1; not suited to pines but can be used to grow hardwoods.)

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[2] Studies made after the correlation of these soils in Bossier Parish indicate that some of them fit better into the Norwood series than into the Yahola series. It is planned that these will be correlated as Norwood soils in the future. The soils that would be more appropriately classified in the Norwood series in whole or in part are as follows:

Yahola silt loam, 0 to 1 percent slopes.
Yahola silty clay loam, 0 to 1 percentage slopes.
Yahola clay, overwash, 0 to 1 percent slopes.
Yahola silt loam, 1 to 3 percent slopes.
Yahola silty clay loam, 1 to 3 percent slopes.
Yahola clay, overwash, 1 to 3 percent slopes.
Yahola soils, overflow, 0 to 3 percent slopes.

Yahola silty clay loam, 0 to 1 percent slopes (Yn).—This is a moderately fine textured, moderately alkaline, slowly permeable soil on the Red River bottom lands. The A_p horizon of reddish-brown or dark reddish-brown silty clay loam is 5 to 8 inches thick. The layer beneath is reddish-brown silty clay or silty clay loam and is 8 to 12 inches thick. It is underlain by light reddish-brown silt loam or very fine sandy loam several feet in thickness and in many places thinly stratified with silty clay or silty clay loam. The profile of this soil, below a depth of about 14 to 20 inches, is similar to that of Yahola silt loam, 0 to 1 percent slopes.

Small areas of Miller silty clay loam are included in this mapping unit.

This soil is well suited to cotton, corn, small grain, and the common hay and pasture plants. Most of the soil is cultivated, mainly to cotton and corn. (Capability unit IIw–1; not suited to pines but can be used to grow hardwoods.)

Yahola clay, overwash, 0 to 1 percent slopes (Ya).—This is a very slowly permeable, moderately alkaline soil that has a moderately permeable to rapidly permeable substratum. It occupies natural levees that have received a thin deposit of fine-textured alluvium as a result of shifting patterns of deposition and changes in the river channel. The surface layer, 6 to 12 inches in thickness, is a clay or silty clay that has a strong, fine, angular blocky structure. Beneath the surface layer, the profile is similar to that of Yahola silt loam, 0 to 1 percent slopes.

This soil is fairly well suited to the common hay and pasture plants. About 40 percent is cultivated, and about 60 percent is used for hay or pasture. (Capability unit IIIw–1; not suited to pines but can be used to grow hardwoods.)

Yahola silt loam, 1 to 3 percent slopes (Ym).—This is a well-drained soil that has moderate to moderately slow permeability. Its profile is like that of Yahola silt loam, 0 to 1 percent slopes. It is suited to about the same crops, but it has a slight to moderate hazard of erosion. About 80 percent of the acreage is cultivated, and 20 percent is in hay or pasture. (Capability unit IIe–1; not suited to pines but can be used to grow hardwoods.)

Yahola very fine sandy loam, 1 to 3 percent slopes (Ys).—This soil has a slightly coarser textured surface layer and a coarser textured, less stratified subsoil than Yahola silt loam, 0 to 1 percent slopes. In other characteristics the profiles are about the same. It is suitable for the same crops as Yahola silt loam, 0 to 1 percent slopes, but yields are usually slightly lower. About 70 percent of this soil is cultivated, about 25 percent is used for pasture or hay, and 5 percent is grazed woodland. (Capability unit IIe–1; not suited to pines but can be used to grow hardwoods.)

Yahola very fine sandy loam, 3 to 8 percent slopes (Yt).—This medium-textured, moderately permeable soil occupies short slopes near drainageways and old channels. It is slightly coarser textured and generally less stratified than Yahola silt loam, 0 to 1 percent slopes, but in other characteristics the profiles are about the same.

This soil is fairly well suited to cultivated crops, but special practices are necessary to control erosion. It is well suited to most hay and pasture plants. About 70 percent is used for pasture or hay, and 30 percent is cultivated. (Capability unit IIIe–2; not suited to pines but can be used to grow hardwoods.)

Yahola very fine sandy loam, undulating (Yv).—This soil has uneven, short, complex slopes, mostly of 1 to 3 percent. The surface layer is slightly coarser textured, and the subsoil is less stratified; otherwise, the profile is similar to that of Yahola silt loam, 0 to 1 percent slopes.

This soil is fairly well suited to the common cultivated crops. It is well suited to most hay and pasture plants. About 67 percent of this soil is cultivated, and the rest is used for pasture or hay. (Capability unit IIw–4; not suited to pines but can be used to grow hardwoods.)

Yahola silty clay loam, 1 to 3 percent slopes (Yo).—This slowly permeable soil occupies short slopes near drainageways and old channels on the Red River bottom land. Its profile is like that of Yahola silt loam, 0 to 1 percent slopes, except that the upper part is finer textured. The soil has a moderately fine textured surface layer and a moderately fine textured subsoil. It is underlain by medium-textured alluvium.

This soil is suited to about the same crops as Yahola silt loam, 1 to 3 percent slopes. Yields are generally slightly lower. There is a slight to moderate hazard of erosion because of the short slopes. Running of rows across the slope and diversion of water from higher areas are normally enough to control erosion. About 70 percent of this soil is cultivated, and 30 percent is in pasture. (Capability unit IIe–1; not suited to pines but can be used to grow hardwoods.)

Yahola clay, overwash, 1 to 3 percent slopes (Yc).—This soil occupies short slopes on natural levees near former channels on the Red River bottom land. Thin deposits of fine-textured alluvium have been added to its surface as a result of shifts in the river channel and changing patterns of deposition. The surface layer is fine textured, and the subsurface layers are medium textured. The profile of this soil differs from that of Yahola silt loam, 1 to 3 percent slopes, principally in the upper layers, but below a depth of about 6 to 12 inches they are similar.

This soil is fairly well suited to the common cultivated crops and to hay and pasture. About 60 percent is cultivated, and 40 percent is used for hay or pasture. (Capability unit IIIe–1; not suited to pines but can be used to grow hardwoods.)

Yahola soils, overflow, 0 to 3 percent slopes (Yp).—This mapping unit consists chiefly of Yahola silt loam and Yahola very fine sandy loam; some minor areas are Yahola silty clay loam and Yahola clay. Most of it is on the flood plain between the river channel and the protective levees. The higher areas are not flooded every year, but those not actually covered by water are isolated by flooding of soils around them.

In many areas the surface is undulating because of cutting by floodwater. Many areas are subject to severe bank caving. This is most common on the outside of river bends where the current forces water against the bank.

These soils are not suited to cultivation. Their suitability for improved pasture is limited. Common bermudagrass is fairly well suited because of its ability to recover after top growth has been killed by flooding. Nearly all of these areas are used for seasonal grazing. Some areas support young stands of cottonwood. About 60 percent of the acreage is grazed woodland, and 40 percent is open pasture. (Capability unit Vw-2; not suited to pines but can be used to grow hardwoods.)

Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable they are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, grazing, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it have little or no erosion hazard but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping of soils for many statements about their management. Capability units are generally identified by numbers assigned locally, for example, IIe-1 or IIIe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive land-forming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this parish, are described in the list that follows.

Class I. Soils that have a few limitations that restrict their use.
  Unit I-1. Level silty or sandy soils of front lands of the Red River.
  Unit I-2. Level soils of old natural levees, mostly along tributaries of the Red River.
  Unit I-3. Level, mostly moderately permeable, well-drained soils of stream terraces.

Class II. Soils that have some limitations that reduce the choice of plants or require moderate conservation practices.
  Subclass IIe. Soils that have a moderate risk of erosion if they are not protected.
    Unit IIe-1. Nearly level silty or sandy soils of front lands of the Red River.
    Unit IIe-2. Nearly level soils of old natural levees, mostly along tributaries of the Red River.
    Unit IIe-3. Gently sloping, mostly moderately permeable, well-drained soils of stream terraces.
  Subclass IIw. Soils that have moderate limitations because of excess water.
    Unit IIw-1. Level, mixed soils of the Red River bottom lands.
    Unit IIw-2. Level, medium-textured to fine-textured, slowly permeable soils of the Red River bottom lands.
    Unit IIw-3. Level or nearly level, slightly wet, slowly permeable soils, mostly of stream terraces.
    Unit IIw-4. Undulating sandy soils of front lands of the Red River.
    Unit IIw-5. Well drained to moderately well drained soils of bottom lands of local streams.

Class III. Soils that have severe limitations that reduce the choice of plants, require special conservation practices, or both.
  Subclass IIIe. Soils that have a severe risk of erosion if they are cultivated and not protected.
    Unit IIIe-1. Mostly nearly level, stiff or buckshot soils of the Red River bottom lands.
    Unit IIIe-2. Gently sloping to moderately sloping sandy soils of front lands of the Red River.
    Unit IIIe-3. Gently sloping soils of old natural levees, mostly along tributaries of the Red River.
    Unit IIIe-4. Gently sloping to moderately sloping, moderately to slowly permeable soils, mostly of uplands.
    Unit IIIe-5. Gently sloping, somewhat poorly drained to moderately well drained, mostly very slowly permeable soils.
    Unit IIIe-6. Gently sloping, well drained to moderately well drained, very slowly permeable soils.
    Unit IIIe-7. Gently sloping, alkaline clay soils of stream terraces.
  Subclass IIIw. Soils that have severe limitations because of excess water.
    Unit IIIw-1. Level, stiff or buckshot soils of the Red River bottom lands.
    Unit IIIw-2. Undulating buckshot soils of the Red River bottom lands.

Unit IIIw-3. Depressed, poorly drained, stiff soils of the Red River bottom lands.

Unit IIIw-4. Level or very gently sloping, mostly slightly wet, moundy, slowly or very slowly permeable soils of terraces.

Subclass IIIs. Soils that have severe limitations of moisture capacity or tilth.

Unit IIIs-1. Level to gently sloping, deep, very sandy soils.

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVe. Soils that have a very severe risk of erosion if they are cultivated and not protected.

Unit IVe-1. Strongly sloping, mostly well-drained, slowly permeable soils of uplands.

Unit IVe-2. Strongly sloping, deep, very sandy soils.

Subclass IVw. Soils that have very severe limitations for cultivation, because of excess water.

Unit IVw-1. Level, poorly drained soils of flatwoods on stream terraces.

Class V. Soils that have little or no erosion hazard but have other limitations that are impractical to remove without major reclamation, and that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Subclass Vw. Soils too wet for cultivation; drainage or protection not feasible.

Unit Vw-1. Frequently overflowed, mostly poorly drained soils of bottom lands of local streams.

Unit Vw-2. Frequently overflowed, mostly fine-textured soils of the Red River bottom lands.

Unit Vw-3. Very frequently overflowed, dominantly sandy soils of the flood plain of the Red River.

Class VI. Soils that have severe limitations that make them generally unsuited for cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Subclass VIe. Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIe-1. Very strongly sloping to moderately steep, well-drained soils, mostly of uplands.

Unit VIe-2. Gently to strongly sloping, very slowly permeable, acid soils.

Unit VIe-3. Strongly sloping, alkaline clay soils of stream terraces.

Class VII. Soils that have very severe limitations that make them unsuited for cultivation without major reclamation, and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe. Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIIe-1. Sandy or gravelly, mostly strongly sloping to moderately steep, severely eroded soils.

Unit VIIe-2. Mostly strongly sloping to moderately steep, very slowly permeable soils.

Unit VIIe-3. Severely eroded, alkaline clay soils of stream terraces.

Class VIII. Soils and landforms that have limitations that preclude their use, without major reclamation, for commercial production of plants, and that restrict their use to recreation, wildlife, water supply, or aesthetic purposes. (There are no class VIII soils in Bossier Parish.)

Capability Unit I-1

Level silty or sandy soils of front lands of the Red River

These alkaline or calcareous alluvial soils are on natural levees of the Red River. They are well drained. Permeability is moderate to moderately slow. Air, water, and plant roots penetrate easily, except where a compacted traffic pan has formed. These soils are fertile. Generally they are well supplied with all of the needed plant nutrients except nitrogen.

The soils in this unit are—

Miller silt loam, 0 to 1 percent slopes.
Yahola silt loam, 0 to 1 percent slopes.
Yahola very fine sandy loam, 0 to 1 percent slopes.

About 3 percent of the parish consists of these soils. About 85 percent of the acreage is cultivated, about 15 percent is used for hay or pasture, and less than 1 percent is wooded.

Cotton, corn, soybeans, small grain, and most vegetables are well suited to these soils. Vetch and southern wild winter peas are well suited; they may be used as a winter cover crop or be grown with small grain for hay or grazing. Clover, particularly whiteclover, is well suited and often spreads naturally to uncultivated areas.

Good permanent or temporary pastures are easily established. Common bermudagrass, Coastal bermudagrass, johnsongrass, dallisgrass, millet, and sudangrass are well suited. Alfalfa and fescue are only fairly well suited; they are not generally grown on these soils, because yields are not so good and stands do not last so long as on finer textured soils. Lespedeza is not suited to these soils.

These soils generally do not need any fertilizer except nitrogen. Potash may occasionally be needed for maximum yields of some crops, particularly on Yahola very fine sandy loam.

The chief problem is maintenance of good tilth. A hard, compact layer called a traffic pan or plow pan, 2 to 5 inches thick, may form just below the plowed layer. This pan can be broken up by deep plowing or by subsoiling when the soil is dry. Frequent additions of organic matter will help to maintain and improve the tilth. Good rotations and proper management of crop residues are needed. Growing deep-rooted grasses and legumes for several years will also help loosen the compacted layer, furnish more organic matter, and allow better penetration of water and plant roots.

Many larger areas need some provision for collecting and disposing of runoff water safely. Shallow, single or double field drains, spaced at wide intervals, are generally adequate.

A few farmers irrigate crops on these soils. Cotton or corn is usually row irrigated, after land smoothing or precision grading. A few vegetable growers use sprinklers for irrigation.

Among the trees that grow well on these soils are cottonwood, sweetgum, white ash, green ash, pecan, cherrybark oak, Nuttall oak, Shumard oak, and water oak.

Capability Unit I–2

Level soils of old natural levees, mostly along tributaries of the Red River

This unit consists of one slightly acid to neutral soil that occupies old natural levees along abandoned channels and tributaries of the Red River. It is a well-drained, moderately fertile soil and is easy to work. The penetration of moisture and air is good, except where a traffic pan or a surface crust has formed.

The only soil in this unit is—

Gallion silt loam, 0 to 1 percent slopes.

This soil makes up about 1 percent of the parish. About 60 percent is cultivated, 35 percent is used for pasture or hay, and about 5 percent is wooded.

Cotton, corn, soybeans, small grain, millet, sorghum, sudangrass, most vegetables, and annual winter legumes are well suited to this soil. Under good management, yields are moderate to high.

Most southern warm-season grasses are well suited. Common bermudagrass and Coastal bermudagrass are used for both hay and permanent pasture. Johnsongrass grows well, especially with a winter legume. Whiteclover grows fairly well if it receives enough fertilizer. Alfalfa and fescue are poorly suited and are seldom grown.

This soil is generally not so well supplied with phosphorus and potassium as the soils of capability unit I–1. It should be tested to determine its need for fertilizer. Nitrogen will ordinarily be needed on all crops except legumes, and most areas that have been cropped for many years need moderate amounts of phosphorus and potash for high yields of most crops. Lime is not generally needed, except on crops that have a high lime requirement.

The chief management problem is maintaining the tilth. The naturally low content of organic matter can be raised by adequate fertilization and proper use of crop residues. Growing winter legumes and sod crops is effective.

The surface often crusts over after rain. Traffic pans are common in cultivated fields. Subsoiling, deep plowing, and growing deep-rooted perennial plants help to keep pans from forming and to break up those already formed.

Field drains usually provide orderly collection and removal of runoff.

Sweetgum, red oak, pecan, and cottonwood trees seem particularly well suited to this soil.

Capability Unit I–3

Level, mostly moderately permeable, well-drained soils of stream terraces

These are acid, leached soils of low natural fertility. They occur in small areas on the crests of old natural levees along abandoned or present stream courses. They hold moderate amounts of moisture available for plant use.

The soils in this unit are—

Kalmia very fine sandy loam, 0 to 1 percent slopes.
Prentiss very fine sandy loam, 0 to 1 percent slopes.
Tilden very fine sandy loam, 0 to 1 percent slopes.

These soils make up less than 1 percent of the parish. Most areas are not cultivated regularly, because of their small size, scattered locations, and low natural fertility.

Cotton, corn, small grain, vetch, crimson clover, and most vegetables are fairly well suited to these soils, if the fertility is improved and maintained. Bermudagrass is well suited and produces good yields of hay and forage under good management. Common lespedeza and Kobe lespedeza are fairly well suited. They produce good yields of hay or forage at moderate fertility levels in seasons of well-distributed rainfall.

These soils are responsive to good management, particularly to the application of complete fertilizer. Nitrogen, phosphorus, and potash are commonly needed on all crops except legumes. Legumes usually require phosphorus and potash, and they may require lime.

Loblolly pine and shortleaf pine are well suited to these soils. More detailed information about the productivity and management of woodlands is given in the section "Woodland Suitability Groupings."

Capability Unit IIe–1

Nearly level silty or sandy soils of front lands of the Red River

These soils generally occupy short slopes near abandoned channels and cutoffs. They are similar to the soils of capability unit I–1, but they are more strongly sloping.

These are well-drained soils. Both surface soil and subsoil are medium textured to moderately fine textured. Movement of water and air and penetration of plant roots are good. Moderate to large amounts of moisture are available to plants. Originally, the fertility was high, but in most cultivated fields the organic-matter content is now low.

The soils in this unit are—

Miller silt loam, 1 to 3 percent slopes.
Yahola silt loam, 1 to 3 percent slopes.
Yahola silty clay loam, 1 to 3 percent slopes.
Yahola very fine sandy loam, 1 to 3 percent slopes.

This unit covers less than 1 percent of the parish. Most of it is cultivated to cotton, corn, and small grain; a few areas are in hay or pasture.

Cotton, corn, soybeans, small grain, and most vegetables are well suited to these soils. Vetch, southern wild winter peas, and clover, especially whiteclover, are also well suited. Common bermudagrass, Coastal bermudagrass, johnsongrass, dallisgrass, millet, and sudangrass are well suited for permanent or temporary pastures.

Cotton and other crops that produce little residue should be rotated with well-fertilized corn, small grain, or hay. Winter cover crops help to reduce erosion, increase the content of organic matter, and maintain good tilth.

Most of the slopes are short. Rows are laid out across the slope to control runoff and erosion in cultivated fields. In many places a sodded headland or a field road with shallow ditches at the top of the slope serves as a diversion. Double field drains or laterals are located at the base of many slopes to intercept and dispose of runoff. Sprinklers are the only practical means of irrigating these soils.

Traffic pans are common. They should be broken by deep plowing or subsoiling, or loosened by growing deep-rooted crops.

Capability Unit IIe-2

Nearly level soils of old natural levees, mostly along tributaries of the Red River

This unit contains one soil, which lies near natural drainageways. It is well drained and moderately fertile. Its characteristics, except for slightly stronger slopes and a slight to moderate hazard of erosion, are like those described under capability unit I-2.

The soil in this unit is—

Gallion silt loam, 1 to 3 percent slopes.

This unit occupies less than 1 percent of the parish. About 40 percent is cultivated, 55 percent is in hay or pasture, and 5 percent is wooded.

Cotton, corn, soybeans, small grain, millet, sorghum, sudangrass, most vegetables, and annual winter legumes are well suited to this soil. Common bermudagrass, Coastal bermudagrass, johnsongrass, and most southern warm-season grasses are well suited for pasture or hay.

Rows are generally laid out across the slopes, and the length of the rows is limited, to help control runoff and protect against erosion. Disposal of runoff is generally not a problem, because the slopes are short and near to natural drainageways. Rotations that include close-growing or high-residue crops, such as small grain or mixtures of small grain and legumes, are used, along with winter cover crops, to supply organic matter, improve tilth, and reduce runoff and erosion.

Capability Unit IIe-3

Gently sloping, mostly moderately permeable, well-drained soils of stream terraces

These are acid, leached soils on natural levees. About one-third of the acreage has been moderately eroded.

The surface layer of these soils is fine sandy loam or very fine sandy loam. The subsoil ranges from sandy clay loam to fine sandy loam. The soils are easy to work. Moisture relationships are good, and the available moisture holding capacity is moderate. The natural fertility is low, and the organic-matter content is low.

The soils in this unit are—

Amite fine sandy loam, 1 to 5 percent slopes.
Amite fine sandy loam, 1 to 5 percent slopes, eroded.
Amite fine sandy loam, thick surface, 1 to 5 percent slopes.
Cahaba fine sandy loam, 1 to 5 percent slopes.
Cahaba fine sandy loam, 1 to 5 percent slopes, eroded.
Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded.
Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes.
Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes.
Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes.
Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded.
Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes.
Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded.
Tilden very fine sandy loam, 1 to 5 percent slopes.
Tilden very fine sandy loam, 1 to 5 percent slopes, eroded.

These soils make up nearly 4 percent of the parish. They were once widely cultivated. At present, less than 10 percent is cultivated, about 50 percent is in pasture, and about 40 percent is wooded.

With good management, fair yields of cotton, corn, and small grain are possible on these soils. Bermudagrass, crimson clover, vetch, and lespedeza grow well if properly fertilized. Vegetables that grow best on light, open soils are well suited. Legumes, such as alfalfa, that require high fertility, a good supply of calcium, or a large supply of available moisture, are poorly suited to these soils.

A complete fertilizer, that is, one that contains nitrogen, phosphorus, and potash, is generally needed. Lime is generally required for best growth of legumes.

Winter cover crops and rotations that include high-residue crops are needed to maintain the organic-matter supply and preserve tilth. Rotations that consist of 3 or more years of grass and legumes and 2 or 3 years of intertilled crops, such as cotton or corn, are especially good.

The principal engineering practices are contour cultivation, terrace construction, and building of vegetated waterways and outlets. There is very little irrigation, because of the limited water supply, the restricted choice of delivery systems, and the limited acreage of high-value crops.

Loblolly pine and shortleaf pine are well suited to these soils.

The seeds of crimson clover, vetch, lespedeza, weeds, and other native plants that grow in idle areas, field borders, and pastures provide food for wildlife, particularly upland birds.

Capability Unit IIw-1

Level, mixed soils of the Red River bottom lands

These slowly permeable, slightly wet, alkaline or calcareous soils have moderately fine textured surface and subsurface layers. When tilth is good, the surface soil is granular and fairly easy to work. The available moisture capacity is high. Most areas are nearly flat, and runoff is slow.

The natural fertility is high, but in cultivated areas the organic-matter content is generally low. The content of phosphorus and potassium is high. The supply of natural calcium is abundant.

The soils in this unit are—

Buxin silty clay loam, 0 to 1 percent slopes.
Miller silty clay loam, 0 to 1 percent slopes.
Yahola silty clay loam, 0 to 1 percent slopes.

A little more than 1 percent of the parish consists of these soils. About 70 percent of the acreage is cultivated, 28 percent is in pasture, and 2 percent is wooded.

Cotton, corn, and small grain are well suited and widely grown. Most southern grasses are well suited. Johnsongrass, dallisgrass, and bermudagrass are the chief hay and pasture grasses. Millet, sudangrass, and sorghum are also well suited. Most cool-season legumes, including whiteclover, southern wild winter peas, black medic, and annual yellow sweetclover (*Melilotus indica*) are well suited; they often grow naturally on uncultivated field borders and roadsides. Alfalfa is well suited if adequate surface drainage is provided.

High-residue crops, such as small grain, and rotations that include grasses, legumes, or closely spaced and highly fertilized corn help to maintain the content of organic matter. Winter legumes are not commonly grown as cover crops, because seedbeds on these soils are usually prepared in fall.

Surface drainage is needed for high yields of cultivated crops and pasture. Drainage is ordinarily provided by

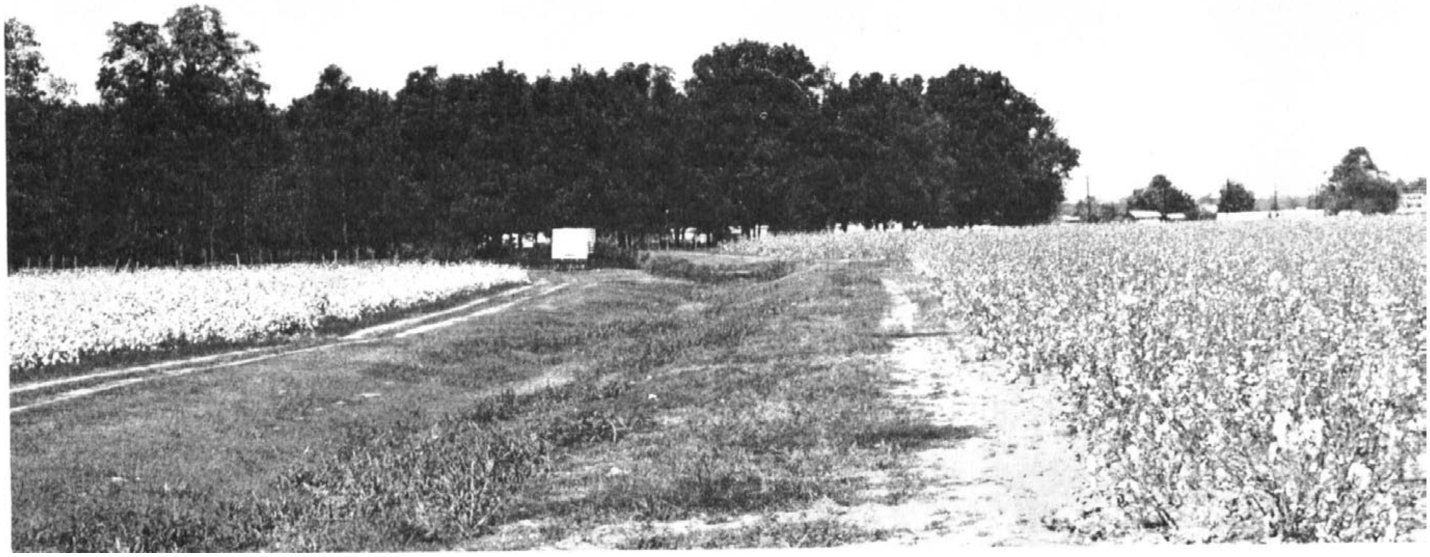

Figure 8.—**Vegetated ditches collect water from field drains and provide orderly disposal of runoff. The soil is Yahola silty clay loam, 0 to 1 percent slopes.**

installing spaced field drains and laterals, by row direction, and by limiting the length of rows to 400 to 600 feet (fig. 8). Tilling, seeding, or harvesting may be delayed for short periods by wetness if surface drainage is not adequate.

Phosphorus and potash are seldom needed. Most crops other than legumes respond to nitrogen. Lime is not needed.

These soils require more draft power for tillage than the medium-textured soils, and they have a narrower range of moisture content within which they can be worked. The natural aggregation of the soil, the resistance to sorting of the land and silt fractions, and natural cracking when the soils dry, all tend to prevent the formation of a traffic pan.

Capability Unit IIw-2

Level, medium-textured to fine-textured, slowly permeable soils of the Red River bottom lands

This unit consists of moderately productive, generally slightly wet soils on older natural levees, mostly on those along tributary streams near the eastern edge of the Red River bottom lands (fig. 9). The surface layer ranges from silt loam to silty clay, and the subsoil ranges from silt loam to clay. The reaction ranges from medium acid to mildly alkaline.

The natural fertility is generally medium. The content of organic matter is low.

The soils in this unit are—

Gallion silty clay loam, 0 to 1 percent slopes.
Gallion soils, mounded, 0 to 1 percent slopes.
Roebuck silt loam, 0 to 1 percent slopes.

Less than 1 percent of the parish is in this capability unit. About 60 percent is cultivated, 35 percent is in pasture, and about 5 percent is wooded.

Cotton, corn, small grain, and most hay and pasture plants are fairly well suited to these soils if the supply of nutrients is maintained and adequate surface drainage is established. Alfalfa is poorly suited and is seldom grown.

In some areas, crops respond to both phosphorus and potash; in others, they need only one or the other. All crops except legumes need nitrogen. Lime is not generally needed. The soils should be tested to determine the amount and kind of fertilizer to be added.

Traffic pans are common in cultivated areas, especially where the surface layer is silt loam. Careful management of crop residues, growing of high-residue crops, and frequent use of cover crops for green manure will help to maintain the supply of organic matter.

Tillage operations, especially planting early in spring, may be delayed for several days by wetness. Spaced single or double field drains, row direction, and restriction of row length to 500 to 800 feet are the principal means of improving surface drainage.

Capability Unit IIw-3

Level or nearly level, slightly wet, slowly permeable soils, mostly of stream terraces

The soils in this unit have a fragipan 18 to 28 inches below the surface. The surface layer is silt loam or very fine sandy loam. The subsoil is silt loam, silty clay loam, or sandy clay loam.

These soils are generally cold and wet. Internal drainage ranges from somewhat poor to moderately good. Ordinarily, during winter and spring there is a perched water table above the fragipan in most of these soils. The reaction is moderately acid to strongly acid. The natural fertility is low, and the content of organic matter is low.

The soils in this unit are—

Pheba very fine sandy loam, 0 to 3 percent slopes.
Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes.
Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes.
Stough silt loam, 0 to 3 percent slopes.
Stough silt loam, clay substratum, 0 to 1 percent slopes.
Stough silt loam, clay substratum, 1 to 3 percent slopes.

This unit makes up about 2 percent of the parish. Only a few small fields are cultivated, and a few small areas are in improved pasture. About 15 percent is idle or in unimproved pasture. About 80 percent of the acreage is in woodland.

Small grain, annual lespedeza, southern wild winter peas, bermudagrass, dallisgrass, Pensacola bahiagrass, and ryegrass are fairly well suited to these soils. The common cultivated crops are poorly suited or only fairly well suited because of the low fertility and wetness of the soils.

It is difficult to establish adequate surface drainage. Shallow plowed furrows or field drains in low areas have been used to control water, and the direction of rows has also been planned to carry water off more readily. The establishment of complete drainage systems has not been justified because these soils are generally not used intensively for cultivated crops.

Phosphorus, potash, and nitrogen are generally required for profitable yields. Lime is needed for good growth of legumes, and in some areas it is needed by other crops also.

Loblolly pine is somewhat better suited to these soils than shortleaf pine.

Capability Unit IIw-4

Undulating sandy soils of front lands of the Red River

This unit contains one soil, which lies on point bars (*4*), on the inside of cutoff bends of the river, and along the course of old crevasses. It is moderately permeable, mildly alkaline and calcareous, and well drained. The surface layer and most of the subsurface layers are medium textured. The slopes are short, complex, and uneven. The slope range is from 1 to 3 percent, but there are some slopes of as much as 5 percent.

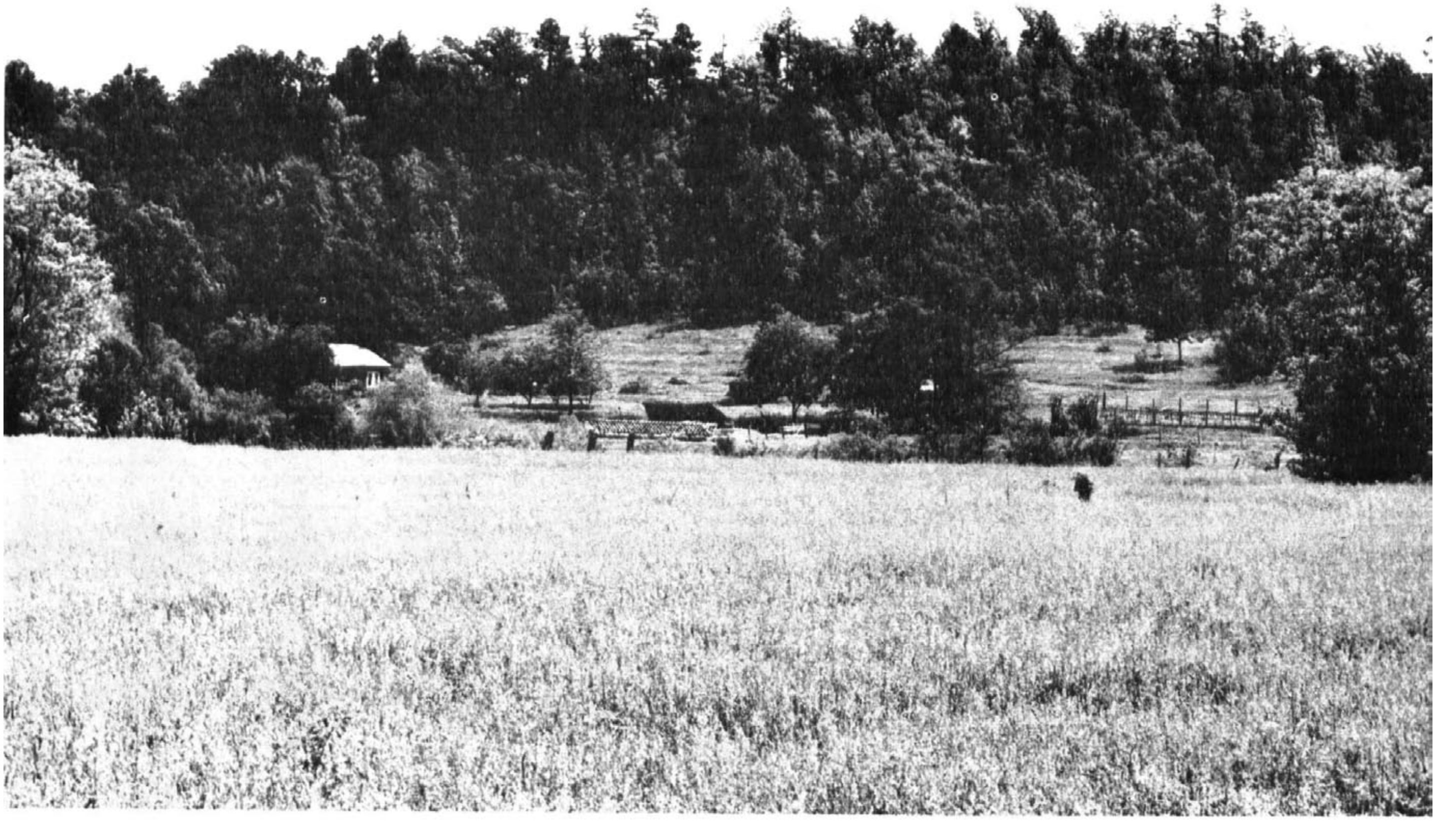

Figure 9.—Oats on soils of capability unit IIw-2 in foreground, forest on soils of capability unit VIIe-2 in background.

The only soil in this unit is—

Yahola very fine sandy loam, undulating.

This unit makes up less than 1 percent of the parish. The size of the areas ranges from about 20 to 100 acres. About two-thirds of the acreage is cultivated, and about one-third is in pasture.

Cotton and corn are the principal cultivated crops. Bermudagrass, johnsongrass, and whiteclover are the principal pasture plants. Alfalfa is generally not well suited to this soil.

This soil is low in nitrogen but is moderate to high in other plant nutrients. A few crops that require a large amount of potassium may need small to moderate applications of potash. The content of organic matter is usually low. Winter cover crops and rotations that include well-fertilized, high-residue crops are needed to supply organic matter.

Traffic pans are common. To prevent their formation, tillage should be kept to a minimum. Subsoiling or deep plowing and growing sod crops or deep-rooted legumes help to break up the pans.

Runoff is controlled chiefly by running the rows as nearly as possible across the slope. Runoff water is collected by field drains in depressions.

Capability Unit IIw–5

Well drained to moderately well drained soils of bottom lands of local streams

These are acid, medium-textured, moderately permeable to slowly permeable, alluvial soils. They are flooded occasionally but not often enough to be more than a slight hazard to crops. Most areas are cut by abandoned stream channels and sloughs and may be isolated by floods for a few days during rainy periods. The slope range is commonly 0.5 to 2 percent; slopes are variable and uneven. The nearly level areas are generally small and closely associated with more sloping areas.

The fertility is medium, and the moisture-holding capacity is medium.

The soils and land type in this unit are—

Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes.
Mixed alluvial land.
Ochlockonee and Iuka sandy loams.

These soils cover less than 1 percent of the parish. About 85 percent of the acreage is wooded, and about 15 percent is used for pasture.

These soils are seldom cultivated, because of the small size of individual areas. Corn is well suited to these soils, however. Cotton, oats, lespedeza, whiteclover, vetch, southern wild winter peas, bermudagrass, Pensacola bahiagrass, and dallisgrass are fairly well suited. Complete fertilizers are usually necessary for moderate to high yields. Lime is usually needed on pastures that include legumes. Carpetgrass grows well in unimproved or unfertilized pastures.

Running the rows across the slopes is almost the only practical way to control water on cultivated fields. Shallow ditches are needed in a few low areas to collect runoff.

Woodlands generally are a mixture of hardwoods and pine. They are of special value to wildlife because of the variety of natural food-producing plants.

Capability Unit IIIe–1

Mostly nearly level, stiff or buckshot soils of the Red River bottom lands

This unit consists of clay soils that change volume considerably as their moisture content varies. Cracks begin to form when the moisture content is just below field capacity, and they widen as the soils dry out. If these soils are plowed when they are moist, large clods are likely to form. After one or two cycles of wetting and drying, these clods generally break down into a mass of fine, angular or rounded aggregates, from which the term "buckshot soils" is taken. These soils are broken in fall or early in winter to take advantage of this natural conditioning.

These soils normally occupy short slopes into natural drains and the side slopes of partly filled old channels. A few small areas are on the back slopes of natural levees. Generally, the slopes are short and erosion is not a serious problem.

The surface layer is clay or silty clay. The subsurface layers range from silt loam to plastic clay. These soils are very slowly permeable. They are well supplied with phosphorus, potassium, calcium, and other plant nutrients, except nitrogen. They are neutral to calcareous.

The soils in this unit are—

Buxin clay, 1 to 3 percent slopes.
Gallion clay, overwash, 1 to 3 percent.
Miller clay, 1 to 3 percent slopes.
Miller clay, 3 to 8 percent slopes.
Roebuck clay, 1 to 3 percent slopes.
Yahola clay, overwash, 1 to 3 percent slopes.

This unit covers a little more than 1 percent of the parish. About half of it is cultivated, and 10 percent is in woodland. About 40 percent, particularly the steeper slopes, is in hay or pasture.

Cotton is fairly well suited to these soils, and yields are good in favorable years. Yields may be reduced by lack of available moisture during the growing season. Yields of corn are usually only fair because of late planting and shortage of available moisture during critical stages of growth. Perennial deep-rooted grasses and legumes, particularly fescue, Coastal bermudagrass, and alfalfa, give moderate to high yields with good management. Whiteclover, black medic, annual yellow sweetclover, and southern wild winter peas are well suited. Dallisgrass, common bermudagrass, and small grain are fairly well suited. Most vegetable crops are poorly suited.

Wetness is not a problem on these soils. Almost no runoff from higher lying areas drains across them. Field roads located at the top of the slopes help to divert runoff. In many places, ditches along the base of the slopes intercept and dispose of runoff water. Water is controlled principally by running the rows across the slope, by restricting the length of rows, and by establishing vegetated drainageways. The only type of irrigation suited to these soils is sprinkling.

These soils can be worked only within a rather narrow range of moisture content, and heavy draft power is required. Poor tilth often delays tilling, seeding, and harvesting.

Capability Unit IIIe–2

Gently sloping to moderately sloping sandy soils of front lands of the Red River

This unit consists of one well-drained, medium-textured soil. Small areas lie near drains or old channels. Most slopes are less than 300 feet long. Movement of water and penetration of plant roots are good. Moderate to high amounts of moisture are available to plants. Natural fertility is moderate to high, except that the supply of nitrogen is low.

This soil is similar to the soil in capability unit IIw–4, but the slopes are more even and somewhat steeper, and they slant in only one direction. The susceptibility to erosion is somewhat greater, and prevention of erosion is more difficult.

The only soil in this unit is—

Yahola very fine sandy loam, 3 to 8 percent slopes.

This capability unit makes up less than one-tenth of 1 percent of the parish. Most of it is in hay or pasture. A few small areas are cultivated with adjoining smoother soils.

The chief cultivated crops are cotton and corn. The principal hay and pasture plants are bermudagrass, johnsongrass, and whiteclover.

Erosion in cultivated areas is controlled principally by running rows across the slopes and by collecting runoff in field drains. Winter cover crops and rotations that include close-growing crops, such as small grain, help to reduce erosion.

Capability Unit IIIe-3

Gently sloping soils of old natural levees, mostly along tributaries of the Red River

This unit consists of one well-drained, moderately fertile soil on very short slopes near the banks of tributary streams. It is like the soils in capability units I-2 and IIe-2, except that it is more sloping.

The only soil in this unit is—

Gallion silt loam, 3 to 5 percent slopes.

Less than 1 percent of the parish is in this capability unit. Most of the acreage is in hay or pasture. A few small areas are cultivated along with adjoining less sloping soils.

Winter cover crops and rotations that include high-residue crops and close-growing crops are essential to control erosion on this soil. Rows should be laid out across the slope, and the length of rows should be limited to less than 600 feet. In a few places field drains are needed to divert water from higher lying areas. Protected outlets may be necessary for safe disposal of excess furrow water.

Using four-row equipment on this soil is not generally practical.

Capability Unit IIIe-4

Gently sloping to moderately sloping, moderately to slowly permeable soils, mostly of uplands

This unit consists of moderately well drained to well drained soils. The surface layer is sandy, and the subsoil consists of sandy clay to sandy loam. In the gravelly soils, about 20 to 30 percent of the surface layer consists of ironstone fragments, and the subsoil also contains fragments but in smaller amounts. More than one-half of the area has lost from one-third to one-half of the original surface soil through erosion.

The capacity for available moisture is moderately low to moderate. The content of organic matter is generally low, especially in cultivated areas. The natural fertility is low. The reaction ranges from slightly acid to strongly acid.

The soils in this unit are—

Amite fine sandy loam, 5 to 8 percent slopes, eroded.
Cahaba fine sandy loam, 5 to 8 percent slopes, eroded.
Kirvin fine sandy loam, 1 to 5 percent slopes, eroded.
Kirvin gravelly fine sandy loam, 1 to 5 percent slopes.
Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded.
Luverne fine sandy loam, 1 to 5 percent slopes, eroded.
Luverne gravelly fine sandy loam, 1 to 5 percent slopes.
Luverne loamy fine sand, thick surface, 1 to 5 percent slopes.
Luverne loamy fine sand, thick surface, 5 to 8 percent slopes.
Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded.
Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded.
Orangeburg fine sandy loam, 1 to 5 percent slopes.
Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded.
Orangeburg fine sandy loam, 5 to 8 percent slopes.
Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded.
Ruston fine sandy loam, 1 to 5 percent slopes.
Ruston fine sandy loam, 1 to 5 percent slopes, eroded.
Ruston fine sandy loam, 5 to 8 percent slopes.
Ruston fine sandy loam, 5 to 8 percent slopes, eroded.
Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes.
Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded.
Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes.
Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded.
Shubuta fine sandy loam, 1 to 5 percent slopes.
Shubuta fine sandy loam, 1 to 5 percent slopes, eroded.
Shubuta gravelly fine sandy loam, 1 to 5 percent slopes.
Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded.
Vaucluse loamy fine sand, 1 to 5 percent slopes.
Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded.

This unit covers about 11 percent of the parish. These soils were formerly widely cultivated. At present, less than 5 percent is cultivated, about 20 percent is pastured, and 75 percent is in woodland.

Cotton, corn, small grain, and lespedeza are fairly well suited to these soils if the supplies of organic matter and plant nutrients are maintained and the soils are protected from erosion. Winter legumes, such as vetch, southern wild winter peas, and crimson clover, are well suited, provided that nutrient levels are kept moderate to high. Bermudagrass, Pensacola bahiagrass, sudangrass, and millet are well suited. Dallisgrass and whiteclover are fairly well suited to the moderately well drained, finer textured soils, but they are poorly suited to the coarser textured soils.

One suitable rotation is 2 years of row crops and 1 or more years of small grain or a mixture of small grain and legumes. Another good rotation consists of 3 years of row crops and 3 or more years of small grain or a mixture of small grain and legumes. A third suitable rotation is 3 years of row crops and 3 or more years of grass-legume pasture. In all of these rotations, it is important that a winter cover crop precede each row crop.

Ordinarily, fertilizer should be applied at least once a year on both cultivated crops and pastures. Crops other than legumes need nitrogen, phosphorus, and potash. Topdressing or sidedressing with additional nitrogen is a good practice. Legumes ordinarily need phosphorus and potash. They are often benefited by nitrogen, especially when they are first seeded on old cultivated fields that are very low in organic matter. Where the soils are strongly acid, legumes need lime.

Water-control practices needed are contour cultivation, a terrace system with vegetated waterways or outlets, and, in a few places, diversion of water from higher slopes. Winter cover crops help to protect these soils against raindrop impact and erosion.

These soils are generally not well suited to multiple-row tractor cultivation because of slope, surface irregularities resulting from past use and erosion, and the small size and irregular shape of the fields.

Loblolly pine and shortleaf pine are well suited to these soils.

Capability Unit IIIe-5

Gently sloping, somewhat poorly drained to moderately well drained, mostly very slowly permeable soils

The soils in this unit have a surface layer of fine sandy loam to silt loam, and all except the Prentiss complex have a subsoil of plastic silty clay or clay. The coarser textured subsoil of the Prentiss soil is underlain by a fragipan. About one-third of the acreage is moderately eroded.

These soils have a moderate capacity for available moisture. The reaction ranges from moderately acid to strongly acid. The natural fertility is low, and the content of organic matter is low.

The soils in this unit are—

Acadia silt loam, 1 to 3 percent slopes.
Muskogee complex, mounded, 1 to 3 percent slopes.
Muskogee silt loam, 1 to 5 percent slopes.
Muskogee silt loam, 1 to 5 percent slopes, eroded.
Prentiss complex, mounded, 1 to 5 percent slopes.
Sawyer fine sandy loam, 1 to 5 percent slopes.
Sawyer fine sandy loam, 1 to 5 percent slopes, eroded.

These soils occupy about 4 percent of the parish. Only a few acres are cultivated. About 10 percent of the acreage is used for pasture, and the rest is in woodland.

Cultivated crops and small grain are fairly well suited to these soils if erosion is controlled and proper amounts of fertilizer and lime are added. Bermudagrass, Pensacola bahiagrass, dallisgrass, ryegrass, sudangrass, whiteclover, southern wild winter peas, and vetch are well suited. Crimson clover is poorly suited to fairly well suited.

Fertilizer should be applied at least once a year. All crops need phosphorus and potash. Nitrogen is needed for all crops except legumes and for the first seeding of legumes where the content of organic matter is very low. Lime is needed for legumes and, where the soils are strongly acid, for other crops.

Contour cultivation, terraces with maximum channel grade, and vegetated waterways or outlets are the chief means of controlling water on cultivated fields. Good drainage in rows is important if winter legumes are grown for cover crops and if crops are planted early. During rainy periods, the lower slopes may not be adequately drained.

Loblolly pine is somewhat better suited to these soils than is shortleaf pine.

Capability Unit IIIe-6

Gently sloping, well drained to moderately well drained, very slowly permeable soils

The soils in this unit have a surface layer of fine sandy loam or very fine sandy loam and a subsoil of red, plastic clay. The surface layer is moderately acid to strongly acid; the subsoil is generally strongly acid; but the underlying layers are neutral to alkaline in some places. Runoff is moderate to moderately rapid. Tilled areas erode easily. The available moisture capacity is moderate. Leaching is not rapid. The natural fertility is low, but the capacity for storing plant nutrients is moderate to high. The content of organic matter is low.

The soils in this unit are—

Boswell fine sandy loam, 1 to 5 percent slopes, eroded.
Hortman very fine sandy loam, 1 to 5 percent slopes, eroded.
McKamie very fine sandy loam, 1 to 5 percent slopes.
McKamie very fine sandy loam, 1 to 5 percent slopes, eroded.

A little more than 1 percent of the parish is composed of these soils. They are not important agriculturally, and only a few small fields are cultivated. About 10 percent of the acreage is pastured, about 10 percent is idle, and 80 percent is wooded.

Cotton and small grain are fairly well suited to these soils. Corn is not so well suited, because it is often damaged by drought. Bermudagrass, Pensacola bahiagrass, ryegrass, dallisgrass, white clover, vetch, crimson clover, and southern wild winter peas grow well if management is good.

If cultivated, these soils need protection from erosion. They need a complete terrace system, contour cultivation, winter cover crops, and rotations that include close-growing, high-residue crops at least 1 year in 3. A rotation that consists of 2 or 3 years of cultivated crops and 3 or more years of grass and legumes is especially good.

Phosphorus and potash are needed for satisfactory yields of all crops and pasture plants. Nitrogen is needed for crops other than legumes, and it often benefits legumes when they are first seeded on soils very low in organic matter. Lime is usually needed for legumes, and it is needed for other crops where the soils are strongly acid.

Loblolly pine and shortleaf pine are well suited to these soils.

Capability Unit IIIe-7

Gently sloping, alkaline clay soils of stream terraces

The soils in this unit are moderately well drained to well drained, but they are very slowly permeable. The available moisture capacity is moderate to low. In dry weather, cracks form. Shallow-rooted, warm-season plants are often damaged by drought.

In most places both the surface soil and the subsoil consist of clay. The natural fertility varies but is generally moderate. Most areas are medium to low in available phosphorus and medium to high in available potassium. The content of organic matter is low to moderate. Most of the soils contain free lime throughout.

The soils in this unit are—

Morse clay, 1 to 5 percent slopes, eroded.
Morse clay, dark surface, 1 to 5 percent slopes.
Morse clay, dark surface, 1 to 5 percent slopes, eroded.

These soils occupy less than 1 percent of the parish. They are seldom cultivated because of the limited choice of crops. Cool-season plants normally grow better on these soils than warm-season plants. Cotton, soybeans, sorghum, and small grain are fairly well suited. Corn, common bermudagrass, and dallisgrass are poorly suited. Coastal bermudagrass, King Ranch bluestem, and Pensacola bahiagrass may be suited to these soils. Most locally grown clovers are fairly well suited, except crimson clover, which is poorly suited.

These soils are difficult to manage because of their poor moisture relationships. The range of moisture content within which they can be worked is rather narrow. The plastic clay surface soil makes good tilth difficult to maintain. The need for fertilizer varies somewhat. Lime is not needed.

Contour cultivation, special terrace design and maintenance practices, and well-vegetated waterways are essential for water control in cultivated areas.

Pine trees are not well suited to these soils and seldom grow on them.

Capability Unit IIIw-1

Level, stiff or buckshot soils of the Red River bottom lands

The soils in this unit are on broad flats or in slightly depressed areas. They are very slowly permeable, moderately well drained to somewhat poorly drained, and slightly wet. The surface layer is plastic clay, and the subsurface layers range from sticky plastic clay to silt loam. These soils change volume considerably as the moisture content varies. They swell when wet, crack when dry, and break into large clods if plowed. The clods generally break down into smaller aggregates under normal weathering. Aeration is poor, and the development of root systems is restricted when the soils are wet.

These soils are normally fairly well to well supplied with phosphorus and potassium, but crops need nitrogen. Most of the soils are neutral to calcareous.

The soils in this unit are—

Buxin clay, 0 to 1 percent slopes.
Gallion clay, overwash, 0 to 1 percent slopes.
Miller clay, 0 to 1 percent slopes.
Roebuck clay, 0 to 1 percent slopes.
Yahola clay, overwash, 0 to 1 percent slopes.

This unit makes up about 10 percent of the acreage of Bossier Parish. About 40 percent is cultivated, about 35 percent is used for hay or pasture, and about 25 percent is in woodland. The present trend is away from cultivation and toward use for hay and pasture.

Cultivated crops are not so well suited to these soils as they are to the coarser textured, more permeable soils on the bottom lands. Cotton is fairly well suited, and yields are good during favorable years. Wetness and poor tilth often make stands of early planted cotton so poor that replanting is necessary. Yields may be reduced by wetness early in the growing season and lack of available moisture later. Yields of corn are normally only fair, because of delayed planting and shortage of available moisture during critical stages of growth. Perennial, deep-rooted grasses and legumes, particularly fescue, Coastal bermudagrass, and alfalfa, give moderate to high yields. Whiteclover, black medic, annual yellow sweetclover, and southern wild winter peas are well suited, and dallisgrass and common bermudagrass are fairly well suited. Small grain is fairly well suited, but harvesting is a problem in wet weather. Most vegetables, especially those that need open permeable soils, are poorly suited.

Adequate surface drainage is especially important on these soils. Wetness and poor trafficability often delay tilling, seeding, and harvesting. The soils can be worked only within a rather narrow range of moisture content. Heavy draft power is required.

Complete drainage systems that include spaced single or double field drains, laterals, main ditches, and outlets are needed on these soils. Rows should be laid out in a direction that will help in drainage, and the length of drainage along each row ordinarily should be restricted to less than 500 feet. The rate of infiltration of water is high when the soils are dry and cracked, but it is very low when the soils are moist.

The supply of organic matter can be maintained under cultivation by careful management of crop residues and the use of rotations that include small grain, a small grain-legume mixture, or a sod crop. A rotation of 3 or more years of alfalfa and 2 or more years of cultivated crops is well suited to these soils.

Capability Unit IIIw-2

Undulating buckshot soils of the Red River bottom lands

This unit consists of very slowly permeable soils in which the surface layer and most of the subsurface layers are of clay. These soils shrink and swell with changes in moisture content. When plowed, they break into large clods that gradually fall apart with weathering.

The slope is generally less than 3 percent. The topography is complex and uneven, in a repeating pattern of narrow ridges, short slopes, and winding small drainageways.

The natural fertility is generally high. The reaction is slightly acid to alkaline.

The soils in this unit are—

Buxin clay, undulating.
Buxin complex, 0 to 3 percent slopes.
Gallion clay, overwash, undulating.
Miller clay, undulating.
Roebuck clay, undulating.

This unit makes up about 1.5 percent of the parish. About 30 percent is cultivated, 45 percent is in hay or pasture, and 25 percent is in woodland.

The common cultivated crops are fairly well suited to these soils, but yields are somewhat lower than on the soils of unit IIIw-1. Yields are considerably reduced in very wet or dry seasons. Coastal bermudagrass, fescue, alfalfa, whiteclover, black medic, annual yellow sweetclover, and southern wild winter peas are well suited to these soils, and dallisgrass and common bermudagrass are fairly well suited.

Nitrogen is normally the only fertilizer needed. Inoculated legumes seldom require fertilizer.

The moisture content is not uniform in these soils, and this makes them uneven in workability. The soils in low, flat areas that receive runoff from the slopes are often wet when the soils on the slopes are ready for tillage. It is difficult to establish and maintain adequate drainage. Rectangular drainage systems can be used in few places. Many areas need to have rows planned to run across the slope, but odd areas and rows of uneven length generally result. Cultivation with multiple-row equipment is difficult. Therefore, these soils are more often used for hay or pasture than the smoother, more easily managed soils.

Water is controlled by single or double field drains along the contour in low areas and by rows across the slope. Frequent ditch cleaning and maintenance are necessary.

There is very little supplemental irrigation. Sprinkler irrigation is the only type suited.

Capability Unit IIIw-3

Depressed, poorly drained, stiff soils of the Red River bottom lands

Only one gray, poorly drained, very slowly permeable soil is in this unit. It lies in depressions along the eastern margin of the Red River bottom lands, along the Flat River, Bodcau Bayou, and other tributaries. In most places, the surface layer is a slightly acid to moderately acid, sticky, plastic clay, and the subsurface layers consist of neutral to alkaline, plastic clay. Runoff is very slow. Water often stands on the surface for several weeks in winter and spring. The supplies of phosphorus and potassium are generally medium.

The one soil in this unit is—

Perry clay.

This soil covers less than 1 percent of the parish. It is not important for agriculture. Most areas are in cutover bottom-land hardwoods. A few small areas are cleared and in unimproved pasture.

Fescue and whiteclover would grow fairly well in adequately drained areas. Wetness, poor aeration, very slow permeability, unfavorable texture, and the difficulty of establishing adequate surface drainage are the chief problems.

This unit is especially suitable for wildlife. Its position and the characteristics of the soil favor the establishment of "green tree" reservoirs and "duck fields."

Capability Unit IIIw-4

Level or very gently sloping, mostly slightly wet, moundy, slowly or very slowly permeable soils of terraces

The soils in this unit have a silt loam or very fine sandy loam surface layer and a subsoil of silty clay loam to clay. Most of them have mounds of highly leached, somewhat coarser textured, more permeable material that cover from 15 to 30 percent of their surface. A claypan or fragipan lies less than 2 feet below the surface.

These are cold, wet soils. A water table is generally perched above the pan during the winter and spring. The mounds interfere with the natural surface drainage and cause uneven moisture conditions.

These soils have low natural fertility. The content of organic matter is low. The reaction is generally strongly acid.

The soils in this unit are—

Acadia complex, mounded, 0 to 3 percent slopes.
Acadia silt loam, 0 to 1 percent slopes.
Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes.
Pheba complex, mounded, 0 to 3 percent slopes.
Prentiss complex, mounded, 0 to 1 percent slopes.
Stough complex, mounded, 0 to 1 percent slopes.

The soils in this unit cover about 5 percent of the parish. Most areas are wooded and have never been cleared. A few acres are in pasture. A few small fields are cultivated at intervals.

Most cultivated crops are poorly suited to these soils. Small grain, sorghum, bermudagrass, lespedeza, dallisgrass, and sudangrass are fairly well suited. Whiteclover and southern wild winter peas are fairly well suited if they receive enough fertilizer and lime. Crimson clover is poorly suited.

The chief problems are wetness, low fertility, and the difficulty of providing surface drainage. Crops grow and mature unevenly because of the mounds. Cultivated crops cannot be grown successfully unless the mounds are smoothed and field drains are installed. The expected yields do not justify this expense.

The best uses for the soils of this unit are woodland and improved pasture. Loblolly pine is somewhat better suited than shortleaf pine.

Capability Unit IIIs-1

Level to gently sloping, deep, very sandy soils

This unit consists of somewhat excessively drained, rapidly permeable, easily leached soils of very low moisture-holding capacity. The natural fertility and the content of organic matter are low to very low. Both the surface layer and subsoil are generally loamy fine sand. There is little runoff; most of the rainfall soaks into the soil. The reaction ranges from slightly acid to moderately acid.

The soils in this unit are—

Huckabee loamy fine sand, 1 to 5 percent slopes.
Independence loamy fine sand, 0 to 1 percent slopes.
Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes.

Less than 1 percent of the parish is in this capability unit. About 20 percent is idle or in poor-quality unimproved pasture, and 80 percent is in woodland. Only small, scattered areas are cultivated.

Watermelons, summer peas, and peanuts are well suited to these soils, but they are seldom grown except for home use. Other vegetables that require a well-drained, open soil are fairly well suited. Most of the common cultivated, pasture, and hay crops are poorly suited to these soils. Vetch and deep-rooted grasses, such as Pensacola bahiagrass and Coastal bermudagrass, are fairly well suited under good management. It is difficult to get a good stand of plants that have small seeds, because the surface layer is loose and dries out rapidly.

A complete fertilizer is needed. It should be applied shortly before the plants need it, because the added nutrients leach from the soils so rapidly.

Water is controlled principally by contour cultivation. Care is necessary to prevent concentration of water. Terraces are not suited to these soils because of the danger of gullying where water breaks through the terraces. Rows should be kept short, and slopes should be broken by well-vegetated strips and drainageways.

Loblolly pine and shortleaf pine are well suited to this unit. Idle land, field borders, and openings in woodland produce a variety of native legumes and other plants that furnish food for wildlife.

Capability Unit IVe-1

Strongly sloping, mostly well-drained, slowly permeable soils of uplands

The soils in this unit are low in natural fertility, and their capacity for available moisture is moderately low to moderate. The organic-matter content is generally low. In the gravelly soils, about 15 to 30 percent of the surface layer consists of ironstone fragments; these fragments generally are present in lesser amounts in the subsoil. The reaction ranges from moderately acid to strongly acid.

The soils in this unit are—

Kirvin fine sandy loam, 5 to 8 percent slopes, eroded.
Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded.
Luverne fine sandy loam, 5 to 8 percent slopes, eroded.
Luverne gravelly fine sandy loam, 5 to 8 percent slopes.

Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes.
Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes, eroded.
Shubuta fine sandy loam, 5 to 8 percent slopes.
Shubuta fine sandy loam, 5 to 8 percent slopes, eroded.
Shubuta gravelly fine sandy loam, 5 to 8 percent slopes.
Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded.
Vaucluse loamy fine sand, 5 to 8 percent slopes.
Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded.

This unit makes up about 5 percent of the parish. Very little is cultivated at present. About 10 percent is idle, 15 percent is used for pasture, and the rest is in woodland.

Most cultivated crops are only fairly well to poorly suited to these soils. They should be followed by winter cover crops and rotated with small grains, grasses, and legumes so that clean-tilled crops are grown not more than 1 year in 4. Bermudagrass, Pensacola bahiagrass, ryegrass, sudangrass, vetch, southern wild winter peas, and crimson clover are all well suited to these soils.

All crops need phosphorus and potash. Nitrogen often benefits legumes, especially when they are first seeded on old fields. All crops other than legumes need nitrogen. Lime is generally needed for the establishment of pasture plants and, where the soil is strongly acid, for other crops.

The ironstone gravel does not seriously obstruct tillage, but it reduces the water-holding capacity of the surface layer enough to lower its suitability for plants that have small seeds or shallow roots.

The principal conservation problems are the control of erosion, the maintenance of organic-matter content, and the improvement of fertility. Water is controlled on cultivated lands by contour cultivation, terraces, and vegetated drainageways and outlets.

Loblolly pine and shortleaf pine are well suited to these soils.

Capability Unit IVe-2

Strongly sloping, deep, very sandy soils

The soils in this unit are similar to those in capability unit IIIs-1. They are sandy and rapidly permeable. Their capacity for holding moisture and plant nutrients is low. Where runoff water concentrates, gullies generally form.

The soils in this unit are—

Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes.

This unit covers only a small fraction of 1 percent of the parish. Most areas are in woodland or are idle.

Small home orchards and gardens, or specialized crops, such as melons, peanuts, and summer peas, are suited to these soils. Terracing should not be attempted, because concentration of water must be avoided.

Woodland is the best use for these soils. Loblolly pine and shortleaf pine are suited.

Capability Unit IVw-1

Level, poorly drained soils of flatwoods on stream terraces

This unit consists of slowly permeable to very slowly permeable, wet soils that occupy flat to slightly depressed areas. The surface layer ranges from very fine sandy loam to silty clay, and the subsoil mainly from silty clay loam to clay. Some areas have from 15 to 30 percent of their surface covered with mounds of coarser textured material. Both surface drainage and internal drainage are very slow. The penetration of roots is often restricted by a high water table, especially in spring. The capacity for available moisture is only moderate. The natural fertility and the content of organic matter are low. The reaction ranges from moderately acid to strongly acid.

The soils in this unit are—

Myatt complex, mounded.
Myatt silt loam.
Wrightsville complex, mounded.
Wrightsville silt loam.
Wrightsville silty clay.

This unit covers nearly 15 percent of the parish. About 95 percent is in woodland. Few areas have been cultivated, and only a small percentage has been cleared for pasture.

The common cultivated crops, such as cotton and corn, are not suited to these soils. If adequate surface drainage and fertilizer are provided, small grain, ryegrass, carpetgrass, dallisgrass, bermudagrass, southern wild winter peas, vetch, and whiteclover are fairly well suited. Crimson clover is not suited.

Lime, phosphorus, and potash are needed to establish improved pastures. Adequate drainage is difficult and expensive to provide in many places because of lack of outlets, uneven surface, and the depressed position of these areas. The cost of clearing, draining, liming, and fertilizing these soils for pasture has restricted their use largely to woodland. Loblolly pine is suited to these soils.

Some areas of this unit are especially suitable for development of "green-tree" reservoirs or "duck fields."

Capability Unit Vw-1

Frequently overflowed, mostly poorly drained soils of bottom lands of local streams

The soils in this unit are flooded frequently. In most places, protection from flooding would require a major coordinated program of public works.

The soils in this unit are—

Bibb silt loam.
Bibb, Myatt, and Stough silt loams, overflow.
Chastain clay.
Mantachie very fine sandy loam.
Mixed wet alluvial land.
Myatt-Stough complex, overflow.

This unit covers about 9 percent of the parish. Nearly all of it is in woodland. The soils are not suitable for cropland. Only a few small areas have been cleared, and most of these have returned to trees. Some areas can be used for pasture, but drainage and protection from floods are needed in most places before improved pastures can be established.

Most of the woodlands consist of hardwoods; some areas have scattered loblolly pine. The principal species are willow oak, southern red oak, sweetgum, blackgum, and hickory. Overcup oak, willow oak, and cypress are dominant on Chastain clay.

Capability Unit Vw-2

Frequently overflowed, mostly fine-textured soils of the Red River bottom lands

The alluvial soils that make up this capability unit are subject to frequent and prolonged flooding, usually by backwater. Most of these soils have a fine-textured surface layer and subsoil. Small areas of Perry soils, overflow, and Yahola soils, overflow, have a medium-textured surface layer and a fine-textured to medium-textured subsurface layer.

The soils in this unit are—

Buxin complex, overflow, 0 to 3 percent slopes.
Miller clay, overflow, 0 to 1 percent slopes.
Perry clay, overflow.
Perry soils, overflow.
Roebuck clay, overflow, 0 to 1 percent slopes.
Yahola soils, overflow, 0 to 3 percent slopes.

The soils in this unit cover about 3 percent of the parish. Most areas are wooded. A few small openings are used for pasture. None of the acreage is cultivated. The damage done by the frequent floods makes these soils unsuitable for cultivated crops and limits their suitability for most improved pasture plants.

Common bermudagrass is fairly well suited to these soils. The top growth is often killed by floodwater late in spring but generally grows again after the water recedes. Johnsongrass is fairly well suited if prolonged flooding does not destroy the stand. In favorable years one or more cuttings of johnsongrass hay can be harvested in open areas. Whiteclover is poorly suited to these soils. It may grow for one or two seasons, but it is easily killed by floodwater and regrowth is slow.

Almost the only practical methods for improving grassland are mowing, brush control, and occasional overseeding with southern wild winter peas. If southern wild winter peas are allowed to mature a seed crop, the stand may persist for several years.

Some areas of these soils are especially suitable for "green tree" reservoirs for ducks.

Capability Unit Vw-3

Very frequently overflowed, dominantly sandy soils of the flood plain of the Red River

This unit consists of low-lying areas next to the river channel. Most areas are flooded at least once a year, usually late in winter or in spring, and the water stands on them for several days or weeks. Alluvial material is frequently deposited on or scoured from these areas by floodwater. The texture of the material is dominantly sandy, but a profile can contain thin layers of almost any texture.

All of the soils in this unit are mapped in one land type—

Riverwash.

These areas make up about 2 percent of the parish. They are used for grazing of the native plants and grasses from time to time and for the production of wood products. The principal trees are cottonwood and willow.

Most areas of Riverwash are covered by a sparse to thick stand of cottonwood and willow trees. These trees are often damaged by shifting currents, shifting patterns of deposition, and channel cutting. Trees more than 15 or 20 years old are scattered and scarce. In a few higher areas away from the active channel are stands of cottonwood 30 or more years old. In the openings there are vines, annual weeds, nutgrass, and scattered patches of common bermudagrass.

These areas provide seasonal food and cover for wildlife.

Capability Unit VIe-1

Very strongly sloping to moderately steep, well-drained soils, mostly of uplands.

The soils in this unit are moderately permeable to slowly permeable. They are acid and have been thoroughly leached. The natural fertility is low.

The soils in this unit are—

Amite fine sandy loam, 8 to 20 percent slopes, eroded.
Kirvin fine sandy loam, 8 to 30 percent slopes.
Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded.
Luverne fine sandy loam, 8 to 20 percent slopes, eroded.
Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded.
Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded.
Shubuta fine sandy loam, 8 to 16 percent slopes, eroded.
Shubuta gravelly fine sandy loam, 8 to 20 percent slopes.
Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded.

This unit covers about 2.5 percent of the parish. About 80 percent of it is wooded, and about 20 percent is in permanent pasture. Practically none is cultivated.

Cultivated crops are not suited to these soils, because of the severe hazard of erosion. Bermudagrass, Pensacola bahiagrass, crimson clover, and vetch are fairly well suited if they are properly fertilized and well managed. Permanent pastures generally need lime and a complete fertilizer.

Plowing should ordinarily be done across the slope or approximately on the contour. When renovating or plowing pastures, care should be taken to provide adequate soil cover during rainy periods.

Loblolly pine and shortleaf pine are well suited to these soils.

Capability Unit VIe-2

Gently to strongly sloping, very slowly permeable, acid soils

This unit consists of well drained to moderately well drained soils that have a sandy surface layer and a plastic clay subsoil layer. The capacity for available moisture is moderate to moderately low. The reaction ranges from slightly acid to strongly acid except in the McKamie soil, which has a moderately alkaline substratum in some places. The natural fertility and the content of organic matter are both low.

The soils in this unit are—

Boswell fine sandy loam, 5 to 8 percent slopes, eroded.
Gore very fine sandy loam, 1 to 5 percent slopes.
Gore very fine sandy loam, 1 to 5 percent slopes, eroded.
Hortman very fine sandy loam, 5 to 8 percent slopes, eroded.
McKamie very fine sandy loam, 5 to 8 percent slopes, eroded.
Susquehanna fine sandy loam, 1 to 8 percent slopes.

These soils cover nearly 5 percent of the parish. About 85 percent is wooded, 10 percent is used for pasture, and 5 percent is idle or is cultivated occasionally.

Cultivated crops are not suited to these soils, because of the severe hazard of erosion. Bermudagrass, Pensacola bahiagrass, southern wild winter peas, vetch, ryegrass, and whiteclover are fairly well suited if they are properly fertilized and well managed. Permanent pastures ordinarily need a complete fertilizer and lime.

Capability Unit VIe-3

Strongly sloping, alkaline clay soils of stream terraces

The one soil in this capability unit is clay, both in the surface layer and in the subsoil. Permeability is very slow. Deep cracks form in dry weather. Shallow-rooted, warm-season plants frequently are damaged by drought. Runoff is rapid.

The only soil in this unit is—

Morse clay, 5 to 8 percent slopes, eroded.

This unit makes up less than 1 percent of the parish.

Cultivated crops are not suited to this soil, chiefly because of excessive erosion under tillage.

Most areas are used for grazing. Many are unfenced and are used by range cattle. The typical native growth consists of needlegrass, weeds, hawthorn, and scattered scrubby post oak. A sparse growth of whiteclover, black medic, or hopclover is generally present late in winter and in spring.

Cool-season grasses and legumes are better suited to this soil than most warm-season plants. Hopclover, whiteclover, and ryegrass are fairly well suited. King Ranch bluestem seems to be fairly well suited. Native grasses, such as common bermudagrass and dallisgrass, are poorly suited.

The need for fertilizer varies, and soil tests are advisable. All crops other than legumes need nitrogen.

Pine trees are poorly suited to this soil. The native hardwood trees are of poor quality and grow slowly.

Capability Unit VIIe-1

Sandy or gravelly, mostly strongly sloping to moderately steep, severely eroded soils

These are acid, well-drained, sandy or gravelly soils. Some are moderately steep. Some are less steep but are severely eroded. The natural fertility and the content of organic matter are low to very low.

The soils in this unit are—

Amite soils, 5 to 20 percent slopes, severely eroded.
Huckabee loamy fine sand, 5 to 20 percent slopes.
Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded.
Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes.
Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded.
Luverne soils, 1 to 20 percent slopes, severely eroded.
Nacogdoches soils, 5 to 30 percent slopes, severely eroded.
Ruston soils, 1 to 8 percent slopes, severely eroded.
Tilden soils, 1 to 8 percent slopes, severely eroded.

This unit covers about 1.6 percent of the parish. About 90 percent is wooded, about 5 percent is used for pasture, and 5 percent is idle.

Cultivated crops are not suited to these soils, and pasture plants are poorly suited. Loblolly pine and shortleaf pine are fairly well suited to well suited.

Capability Unit VIIe-2

Mostly strongly sloping to moderately steep, very slowly permeable soils

The soils in this unit are acid and have a plastic clay subsoil. Runoff is rapid, and about one-half of the area has been severely eroded. The natural fertility and the content of organic matter are low to very low.

The soils in this unit are—

Boswell fine sandy loam, 8 to 20 percent slopes, eroded.
Boswell sandy clay, 5 to 8 percent slopes, severely eroded.
Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded.
Gore very fine sandy loam, 5 to 16 percent slopes, eroded.
McKamie and Hortman soils, 8 to 20 percent slopes.
Muskogee soils, 1 to 8 percent slopes, severely eroded.
Shubuta soils, 5 to 30 percent slopes, severely eroded.
Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded.
Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes.
Susquehanna soils, 8 to 30 percent slopes, eroded.
Susquehanna soils, 5 to 30 percent slopes, severely eroded.

This unit makes up more than 6 percent of the parish. About 90 percent of the unit is wooded, about 5 percent is idle, and 5 percent is used for unimproved pasture.

Because of the strong slopes and severe erosion in most places, cultivated crops are not suited to these soils, and pasture plants are poorly suited. Loblolly pine and shortleaf pine are fairly well suited.

Capability Unit VIIe-3

Severely eroded, alkaline clay soils of stream terraces

This unit consists of very slowly permeable, alkaline clay soils that crack deeply in dry weather. Runoff is very rapid, and in most places these areas are badly gullied. The natural fertility is generally low or very low.

The soils in this unit are—

Morse clay, 3 to 8 percent slopes, severely eroded.
Morse clay, 8 to 20 percent slopes, eroded.

This unit makes up less than 1 percent of the parish, and the individual areas are generally small. Most areas are idle or are seasonally grazed by range cattle. A sparse growth of annual weeds, needlegrass, and hawthorn covers most areas.

Almost the only ways to improve these areas are to control grazing and to increase the native cover by fertilizing. Some smoothing, seeding, and fertilizing of gullies may be advisable.

Pine trees are poorly suited to these soils. Some food and cover for wildlife are produced, especially when grazing is controlled.

Estimated Yields

Estimated average yields of the common crops, hay, and pasture, under two levels of management, are presented in table 5. The estimates were obtained through consultation with farmers and those who advise and work with farmers. In the A columns are yields obtained under the management practices in common use. In the B columns are yields that can be obtained under improved management. All estimates are based on average rainfall over a long period of time, and no irrigation.

Ordinarily, the soils of the Red River bottom lands are better managed than the soils of the uplands and stream terraces. Consequently, the percentage increase in yields between common and improved management is generally less for the soils of the bottom lands than for the soils of the uplands and terraces. Generally, improved management of the bottom-land soils results in a 20 to 50 percent increase in yields of the common cultivated crops, and a 33 to 50 percent increase in yields of hay and carrying capacity of pastures. Improved management of the upland and terrace soils generally results in a 40 to 70 percent increase in yields of cultivated crops, and a 40 to 100 percent increase in yields of hay and carrying capacity of pastures.

Improved management, for all crops and soils, includes the following practices:

Fertilization according to the needs indicated by chemical tests and on the basis of past cropping and fertilizing practices.

Use of crop varieties that are high yielding and suited to the area.

Adequate seedbed preparation.

Planting or seeding by suitable methods, at suitable rates, and at the right times.

Inoculation of legumes, if needed.

Shallow cultivation of row crops.

Control of weeds, insects, and diseases.

Water management where needed: Adequate surface drainage on flat areas; terracing, cultivating on the contour, and sodding outlets of waterways on sloping areas.

Protection from overgrazing.

FERTILIZATION PRACTICES.—Fertilization in accordance with the needs of the soil and the crop is one of the most necessary improvements in management practices for all the soils in the parish. Fertilization practices for the common crops are about as follows:

Soils of the bottom lands.—Under the common level of management, cotton grown on the bottom lands receives about 60 pounds of nitrogen per acre, applied either before planting, at planting, or as a sidedressing. Corn receives about 60 pounds of nitrogen per acre, applied before planting, at planting, or as a sidedressing before the corn is 18 inches high. Oats receive 30 to 45 pounds of nitrogen, applied as a topdressing in spring. Grass grown for hay receives 30 to 45 pounds of nitrogen per acre. In pastures, a mixture of grasses and legumes is maintained.

Under improved management, cotton receives 60 to 100 pounds of nitrogen per acre, applied either before planting, at planting, or as a sidedressing; if tests show the soil is deficient in phosphorus or potassium, about 50 pounds of P_2O_5 and 50 to 70 pounds of K_2O per acre are used. Corn receives 80 to 120 pounds of nitrogen per acre; if the soil is deficient in phosphorus or potassium, 30 pounds of P_2O_5 and 30 to 50 pounds of K_2O are used. Oats receive 45 to 60 pounds of nitrogen as a topdressing in spring. Pasture and hay receive 30 to 60 pounds of nitrogen per acre at planting or before planting; established grass pastures receive 2 to 3 such applications as topdressing.

Soils of the uplands and stream terraces.—Under the common level of management, cotton receives 20 to 30 pounds of nitrogen, 20 to 30 pounds of P_2O_5, and 20 to 30 pounds of K_2O per acre. Corn receives 30 to 45 pounds of nitrogen, 20 to 30 pounds of P_2O_5, and 20 to 30 pounds of K_2O per acre. Stands of corn ordinarily contain about 6,000 plants per acre. Oats receive 20 to 30 pounds of nitrogen, 20 to 30 pounds of P_2O_5, and 20 to 30 pounds of K_2O per acre in fall at planting, and a topdressing of 16 to 30 pounds of nitrogen per acre in spring. For initial establishment, fall-planted legume-grass pasture receives 20 pounds of nitrogen, 30 to 40 pounds of P_2O_5, and 30 to 40 pounds of K_2O per acre. To maintain established stands, 30 to 40 pounds of P_2O_5 and 30 to 40 pounds of K_2O per acre are applied every 2 years. Ordinarily, on acid soils, 1 ton of lime is applied every 5 to 7 years.

Under improved management, cotton receives 50 to 60 pounds of nitrogen, 50 to 60 pounds of P_2O_5, and 50 to 60 pounds of K_2O per acre. If the initial application, at or before planting, includes less than 50 pounds of nitrogen, enough extra nitrogen should be applied to bring the total up to about 60 pounds. Corn receives 70 to 100 pounds of nitrogen, 25 to 50 pounds of P_2O_5, and 25 to 50 pounds of K_2O per acre. Stands ordinarily contain 9,000 to 10,000 plants per acre. Oats receive 30 to 40 pounds of nitrogen, 30 to 40 pounds of P_2O_5, and 20 to 40 pounds of K_2O per acre in fall at planting. In spring, 30 to 40 pounds of nitrogen is applied as a topdressing. Fall-planted legume-grass pasture receives 20 to 40 pounds of nitrogen, 60 to 100 pounds of P_2O_5, and 60 to 100 pounds of K_2O per acre. One or more topdressings of 30 to 60 pounds of nitrogen per acre are added during the grass growing season. The legumes are fertilized each fall with 60 pounds of P_2O_5 and 60 pounds of K_2O. Most of the acid soils of the uplands and terraces need lime at the rate of 1 or 2 tons per acre about every 5 years to keep the pH above 6.

TABLE 5.—*Estimated average acre yields of principal crops*

[Yields in columns A are those under common management; yields in columns B are those under improved management. Where no yield is indicated, the soil is not suited or the crop is not commonly grown]

Mapping unit	Cotton (lint)		Corn		Oats		Hay				Permanent pasture [2]	
							Alfalfa		Bermuda-grass [1]			
	A	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Acres per animal unit* [3]	*Acres per animal unit* [3]
Acadia complex, mounded, 0 to 3 percent slopes	150	250	10	20	15	25	-----	-----	1. 5	3	5	3
Acadia silt loam, 0 to 1 percent slopes	150	250	12	25	20	30	-----	-----	2	3	4	3
Acadia silt loam, 1 to 3 percent slopes	200	300	12	25	20	30	-----	-----	2	3	4	3
Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes	100	200	10	20	15	25	-----	-----	1	2	6	4

See footnotes at end of table.

TABLE 5.—*Estimated average acre yields of principal crops*—Continued

Mapping unit	Cotton (lint)		Corn		Oats		Hay				Permanent pasture [2]	
							Alfalfa		Bermudagrass [1]			
	A	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Acres per animal unit* [3]	*Acres per animal unit* [3]
Amite fine sandy loam, 1 to 5 percent slopes	350	500	30	50	30	50	---	---	2	3. 5	4	3
Amite fine sandy loam, 1 to 5 percent slopes, eroded	275	400	25	40	20	45	---	---	1. 75	3	5	3
Amite fine sandy loam, 5 to 8 percent slopes, eroded	250	375	20	35	20	45	---	---	1. 5	3	5	3
Amite fine sandy loam, 8 to 20 percent slopes, eroded	---	---	---	---	---	---	---	---	---	---	6	4
Amite fine sandy loam, thick surface, 1 to 5 percent slopes	350	450	30	50	30	50	---	---	1. 5	3	5	3
Amite soils, 5 to 20 percent slopes, severely eroded	---	---	---	---	---	---	---	---	---	---	---	---
Bibb silt loam	---	---	---	---	---	---	---	---	---	---	---	---
Bibb, Myatt, and Stough silt loams, overflow	---	---	---	---	---	---	---	---	---	---	---	---
Boswell fine sandy loam, 1 to 5 percent slopes, eroded	250	375	20	35	25	45	---	---	2	3	4	3
Boswell fine sandy loam, 5 to 8 percent slopes, eroded	---	---	---	---	---	---	---	---	1. 5	3	4	3
Boswell fine sandy loam, 8 to 20 percent slopes, eroded	---	---	---	---	---	---	---	---	---	---	6	4
Boswell sandy clay, 5 to 8 percent slopes, severely eroded	---	---	---	---	---	---	---	---	---	---	---	---
Buxin clay, 0 to 1 percent slopes	450	550	35	50	35	50	2	3	---	1. 5	5	3
Buxin clay, 1 to 3 percent slopes	400	500	30	45	35	50	2. 5	3. 5	---	1. 5	5	3
Buxin clay, undulating	350	450	30	40	30	45	2	3	---	1. 5	5	3
Buxin complex, 0 to 3 percent slopes	350	450	30	40	30	45	---	---	---	1. 5	5	3
Buxin complex, overflow, 0 to 3 percent slopes	---	---	---	---	---	---	---	---	---	---	---	---
Buxin silty clay loam, 0 to 1 percent slopes	550	650	60	80	55	70	2	3	2	3	4	2. 5
Cahaba fine sandy loam, 1 to 5 percent slopes	350	500	30	50	30	50	---	---	2	3. 5	4	3
Cahaba fine sandy loam, 1 to 5 percent slopes, eroded	275	400	25	40	20	45	---	---	1. 5	3	5	3
Cahaba fine sandy loam, 5 to 8 percent slopes, eroded	250	375	20	35	20	45	---	---	1. 5	3	5	3
Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded	275	400	25	40	20	45	---	---	1. 5	3	5	3
Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes	350	500	30	50	30	50	---	---	2. 5	3. 5	4	3
Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes	350	500	30	50	30	50	---	---	2	3. 5	4	3
Chastain clay	---	---	---	---	---	---	---	---	---	---	---	---
Gallion clay, overwash, 0 to 1 percent slopes	450	600	30	45	35	50	---	---	---	1. 5	5	3
Gallion clay, overwash, 1 to 3 percent slopes	450	600	30	45	35	50	---	---	---	1. 5	5	3
Gallion clay, overwash, undulating	400	500	30	45	30	45	---	---	---	1. 5	5	3
Gallion silt loam, 0 to 1 percent slopes	500	700	50	70	60	75	---	---	3	4	3	2
Gallion silt loam, 1 to 3 percent slopes	450	650	45	65	60	75	---	---	3	4	3	2
Gallion silt loam, 3 to 5 percent slopes	400	600	40	60	55	70	---	---	2. 5	3. 5	3. 5	2. 5
Gallion silty clay loam, 0 to 1 percent slopes	500	650	50	70	60	75	---	---	2. 5	3. 5	3. 5	2. 5
Gallion soils, mounded, 0 to 1 percent slopes	450	600	45	65	55	65	---	---	2. 5	3. 5	3. 5	2. 5
Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded	---	---	---	---	---	---	---	---	---	---	---	---
Gore very fine sandy loam, 1 to 5 percent slopes	---	---	---	---	---	---	---	---	1. 5	2. 5	5	3
Gore very fine sandy loam, 1 to 5 percent slopes, eroded	---	---	---	---	---	---	---	---	1	2	6	4
Gore very fine sandy loam, 5 to 16 percent slopes, eroded	---	---	---	---	---	---	---	---	---	---	6	4
Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes	350	600	30	60	30	60	---	---	2	4	4	2. 5
Hortman very fine sandy loam, 1 to 5 percent slopes, eroded	250	375	20	35	25	45	---	---	2	3	4	3
Hortman very fine sandy loam, 5 to 8 percent slopes, eroded	---	---	---	---	---	---	---	---	1. 5	3	4	3
Huckabee loamy fine sand, 1 to 5 percent slopes	175	250	10	25	15	25	---	---	---	---	---	---
Huckabee loamy fine sand, 5 to 20 percent slopes	---	---	---	---	---	---	---	---	---	---	---	---
Independence loamy fine sand, 0 to 1 percent slopes	250	400	20	40	20	40	---	---	1. 5	2. 5	5	3
Kalmia very fine sandy loam, 0 to 1 percent slopes	350	500	30	50	30	50	---	---	2	3. 5	4	3
Kirvin fine sandy loam, 1 to 5 percent sploes, eroded	275	400	25	40	25	45	---	---	1. 5	3	5	3
Kirvin fine sandy loam, 5 to 8 percent slopes, eroded	---	---	---	---	25	40	---	---	1. 5	3	5	3
Kirvin fine sandy loam, 8 to 30 percent slopes	---	---	---	---	---	---	---	---	---	---	6	4
Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded	---	---	---	---	---	---	---	---	---	---	---	---
Kirvin gravelly fine sandy loam, 1 to 5 percent slopes	300	500	25	40	30	50	---	---	1. 5	3	5	3
Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded	275	400	20	40	25	45	---	---	1. 5	3	5	3
Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded	200	300	15	30	20	35	---	---	1. 5	3	5	3
Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded	---	---	---	---	---	---	---	---	---	---	7	4
Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes	175	250	10	25	15	25	---	---	---	---	9	5

See footnotes at end of table.

TABLE 5.—*Estimated average acre yields of principal crops*—Continued

Mapping unit	Cotton (lint)		Corn		Oats		Hay				Permanent pasture [2]	
							Alfalfa		Bermudagrass [1]			
	A	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Acres per animal unit* [3]	*Acres per animal unit* [3]
Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes	150	200	10	20	15	25	-----	-----	-----	-----	9	5
Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Luverne fine sandy loam, 1 to 5 percent slopes, eroded	275	400	25	40	20	45	-----	-----	1. 75	3	5	3
Luverne fine sandy loam, 5 to 8 percent slopes, eroded	250	375	20	35	20	45	-----	-----	1. 5	3	5	3
Luverne fine sandy loam, 8 to 20 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Luverne gravelly fine sandy loam, 1 to 5 percent slopes	275	400	25	40	20	45	-----	-----	1. 75	3	5	3
Luverne gravelly fine sandy loam, 5 to 8 percent slopes	200	300	15	30	20	45	-----	-----	1. 75	3	5	3
Luverne loamy fine sand, thick surface, 1 to 5 percent slopes	250	375	20	35	20	35	-----	-----	-----	-----	6	4
Luverne loamy fine sand, thick surface, 5 to 8 percent slopes	200	300	10	25	20	35	-----	-----	1	2	6	4
Luverne soils, 1 to 20 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7	5
Mantachie very fine sandy loam	-----	-----	-----	-----	-----	-----	-----	-----	2	3. 5	4	2. 5
McKamie very fine sandy loam, 1 to 5 percent slopes	275	400	25	40	20	45	-----	-----	1. 75	3	5	3
McKamie very fine sandy loam, 1 to 5 percent slopes, eroded	250	375	20	35	20	45	-----	-----	1. 5	3	5	3
McKamie very fine sandy loam, 5 to 8 percent slopes, eroded					20	45	-----	-----	1. 5	3	5	3
McKamie and Hortman soils, 8 to 20 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Miller clay, 0 to 1 percent slopes	500	650	35	50	35	50	3. 5	5	-----	1. 5	5	3
Miller clay, 1 to 3 percent slopes	450	650	30	45	35	50	4	5	-----	1. 5	5	3
Miller clay, 3 to 8 percent slopes	400	500	-----	-----	30	45	3	4. 5	-----	1. 5	5	3
Miller clay, undulating	400	500	30	45	30	45	2. 5	3. 5	-----	1. 5	5	3
Miller clay, overflow, 0 to 1 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Miller silt loam, 0 to 1 percent slopes	650	800	70	90	65	80	3	4	3	4	3	2
Miller silt loam, 1 to 3 percent slopes	600	750	65	85	65	80	3	4	3	4	3	2
Miller silty clay loam, 0 to 1 percent slopes	550	700	65	85	65	80	3	4	2. 5	3. 5	4	3
Mixed alluvial land	350	500	30	50	25	45	-----	-----	1. 5	2. 5	4	3
Mixed wet alluvial land	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	5	3
Morse clay, 1 to 5 percent slopes, eroded	100	200	10	20	15	25	-----	-----	-----	-----	7	5
Morse clay, 5 to 8 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7	5
Morse clay, 8 to 20 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7	5
Morse clay, 3 to 8 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	8	6
Morse clay, dark surface, 1 to 5 percent slopes	150	250	15	25	15	25	-----	-----	-----	-----	6	4
Morse clay, dark surface, 1 to 5 percent slopes, eroded	100	200	10	20	15	25	-----	-----	-----	-----	7	4
Muskogee complex, mounded, 1 to 3 percent slopes	150	250	20	35	20	35	-----	-----	1. 75	3	5	3
Muskogee silt loam, 1 to 5 percent slopes	275	400	25	40	20	45	-----	-----	2	3	5	3
Muskogee silt loam, 1 to 5 percent slopes, eroded	250	375	20	35	20	45	-----	-----	1. 75	3	5	3
Muskogee soils, 1 to 8 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Myatt complex, mounded	100	175	8	15	15	25	-----	-----	1	2	6	4
Myatt silt loam	100	175	8	15	15	25	-----	-----	1. 5	2. 5	6	4
Myatt-Stough complex, overflow	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded	350	500	30	50	30	50	-----	-----	2	3. 5	5	3
Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded	300	450	25	40	30	50	-----	-----	2	3. 5	5	3
Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Nacogdoches soils, 5 to 30 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7	5
Ochlockonee and Iuka sandy loams	350	500	30	60	[4] 15	[4] 25	-----	-----	2. 5	3. 5	4	2. 5
Orangeburg fine sandy loam, 1 to 5 percent slopes	350	500	30	50	30	50	-----	-----	2	3. 5	5	3
Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded	300	400	25	45	20	45	-----	-----	1. 75	3	5	3
Orangeburg fine sandy loam, 5 to 8 percent slopes	325	400	25	45	25	45	-----	-----	2	3	5	3
Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded	275	375	25	45	20	45	-----	-----	1. 75	3	5	3
Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Perry clay	200	300	15	30	20	35	-----	-----	. 75	1. 5	4	3
Perry clay, overflow	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Perry soils, overflow	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

See footnotes at end of table.

TABLE 5.—*Estimated average acre yields of principal crops*—Continued

Mapping unit	Cotton (lint)		Corn		Oats		Hay				Permanent pasture [2]	
							Alfalfa		Bermudagrass [1]			
	A	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Acres per animal unit* [3]	*Acres per animal unit* [3]
Pheba complex, mounded, 0 to 3 percent slopes	150	250	10	20	15	25	-----	-----	2	3. 5	5	3
Pheba very fine sandy loam, 0 to 3 percent slopes	175	275	12	25	20	30	-----	-----	2	3. 5	5	3
Prentiss complex, mounded, 0 to 1 percent slopes	175	300	15	30	25	35	-----	-----	2	3	5	3
Prentiss complex, mounded, 1 to 5 percent slopes	200	325	15	35	25	40	-----	-----	2	3	5	3
Prentiss very fine sandy loam, 0 to 1 percent slopes	275	400	25	40	25	45	-----	-----	2	3	5	3
Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes	300	450	30	50	30	50	-----	-----	2	3. 5	5	3
Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes	300	425	30	50	30	50	-----	-----	2	3. 5	5	3
Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded	275	400	25	45	25	45	-----	-----	1. 75	3	5	3
Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes	150	250	12	25	20	40	-----	-----	1. 75	3	5	3
Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes	275	425	25	40	25	45	-----	-----	2	3	5	3
Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded	250	400	25	40	25	45	-----	-----	2	3	5	3
Riverwash	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Roebuck clay, 0 to 1 percent slopes	450	600	35	50	35	50	2	3	-----	1. 5	5	3
Roebuck clay, 1 to 3 percent slopes	400	600	30	50	35	50	2. 5	3. 5	-----	1. 5	5	3
Roebuck clay, undulating	350	450	25	45	30	45	2	3	-----	1. 5	5	3
Roebuck clay, overflow, 0 to 1 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Roebuck silt loam, 0 to 1 percent slopes	400	500	35	50	40	60	-----	-----	2	3. 5	4	3
Ruston fine sandy loam, 1 to 5 percent slopes	300	500	25	50	30	50	-----	-----	2	3. 5	5	3
Ruston fine sandy loam, 1 to 5 percent slopes, eroded	275	450	20	45	25	45	-----	-----	1. 75	3	5	3
Ruston fine sandy loam, 5 to 8 percent slopes	275	450	20	45	25	45	-----	-----	1. 75	3	5	3
Ruston fine sandy loam, 5 to 8 percent slopes, eroded	250	400	15	35	20	40	-----	-----	1. 5	3	5	3
Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes	275	450	25	45	30	50	-----	-----	2	3. 5	5	3
Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded	250	400	20	40	25	40	-----	-----	2	3	5	3
Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes	200	350	15	35	25	45	-----	-----	2	3	5	3
Ruston fine sandy loam, hard subtratum, 5 to 8 percent slopes, eroded	150	250	10	25	20	40	-----	-----	1. 75	3	5	3
Ruston soils, 1 to 8 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes	250	400	20	40	25	45	-----	-----	2	3. 5	5	3
Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded	225	400	15	35	25	45	-----	-----	1. 75	3	5	3
Sawyer fine sandy loam, 1 to 5 percent slopes	250	400	20	40	25	45	-----	-----	2	3. 5	5	3
Sawyer fine sandy loam, 1 to 5 percent slopes, eroded	225	400	15	35	25	45	-----	-----	1. 75	3	5	3
Shubuta fine sandy loam, 1 to 5 percent slopes	300	450	25	45	30	50	-----	-----	2	3	5	3
Shubuta fine sandy loam, 1 to 5 percent slopes, eroded	275	400	20	40	25	45	-----	-----	1. 75	3	6	3
Shubuta fine sandy loam, 5 to 8 percent slopes	200	300	15	35	25	45	-----	-----	2	3	5	3
Shubuta fine sandy loam, 5 to 8 percent slopes, eroded	150	250	10	25	20	40	-----	-----	1. 75	3	5	3
Shubuta fine sandy loam, 8 to 16 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Shubuta gravelly fine sandy loam, 1 to 5 percent slopes	275	400	20	40	25	45	-----	-----	1. 75	3	6	4
Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded	250	400	20	35	20	40	-----	-----	1. 5	2. 5	6	4
Shubuta gravelly fine sandy loam, 5 to 8 percent slopes	200	300	15	35	25	45	-----	-----	1. 75	3	6	4
Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded	150	250	10	25	25	45	-----	-----	1. 5	2. 5	6	4
Shubuta gravelly fine sandy loam, 8 to 20 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Shubuta soils, 5 to 30 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Stough complex, mounded, 0 to 1 percent slopes	150	250	10	20	20	40	-----	-----	2	3	5	3
Stough silt loam, 0 to 3 percent slopes	150	250	12	25	20	40	-----	-----	2	3. 5	5	3
Stough silt loam, clay substratum, 0 to 1 percent slopes	150	250	12	25	20	40	-----	-----	2	3	5	3
Stough silt loam, clay substratum, 1 to 3 percent slopes	175	300	12	35	25	45	-----	-----	2	3. 5	5	3

See footnotes at end of table.

TABLE 5.—*Estimated average acre yields of principal crops*—Continued

Mapping unit	Cotton (lint)		Corn		Oats		Hay: Alfalfa		Hay: Bermudagrass [1]		Permanent pasture [2]	
	A	B	A	B	A	B	A	B	A	B	A	B
	Lb.	*Lb.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Acres per animal unit* [3]	*Acres per animal unit* [3]
Susquehanna fine sandy loam, 1 to 8 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	2	3	5	3
Susquehanna soils, 8 to 30 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	6	4
Susquehanna soils, 5 to 30 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tilden soils, 1 to 8 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Tilden very fine sandy loam, 0 to 1 percent slopes	350	500	30	50	30	50	-----	-----	2	3. 5	4	3
Tilden very fine sandy loam, 1 to 5 percent slopes	325	475	25	45	30	50	-----	-----	2	3. 5	5	3
Tilden very fine sandy loam, 1 to 5 percent slopes, eroded	300	450	20	40	25	45	-----	-----	1. 5	3. 5	5	3
Vaucluse loamy fine sand, 1 to 5 percent slopes	200	300	12	35	15	35	-----	-----	-----	-----	-----	-----
Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded	175	250	10	30	15	35	-----	-----	-----	-----	-----	-----
Vaucluse loamy fine sand, 5 to 8 percent slopes	150	200	10	25	15	35	-----	-----	-----	-----	-----	-----
Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded	125	175	10	25	15	30	-----	-----	-----	-----	-----	-----
Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Wrightsville complex, mounded	100	150	8	20	15	25	-----	-----	-----	-----	6	4
Wrightsville silt loam	100	175	8	25	15	25	-----	-----	-----	-----	6	4
Wrightsville silty clay	100	175	8	20	15	25	-----	-----	-----	-----	-----	-----
Yahola clay, overwash, 0 to 1 percent slopes	450	650	40	60	40	60	-----	-----	1. 5	2. 5	5	3
Yahola clay, overwash, 1 to 3 percent slopes	400	600	35	60	40	60	-----	-----	1. 5	2. 5	5	3
Yahola silt loam, 0 to 1 percent slopes	650	800	70	90	65	80	-----	-----	3	4	3	2
Yahola silt loam, 1 to 3 percent slopes	600	700	65	85	65	80	-----	-----	3	4	3	2
Yahola silty clay loam, 0 to 1 percent slopes	650	750	65	85	65	80	-----	-----	2. 5	3. 5	3	2
Yahola silty clay loam, 1 to 3 percent slopes	600	700	60	80	65	80	-----	-----	2. 5	3. 5	3	2
Yahola soils, overflow, 0 to 3 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Yahola very fine sandy loam, 0 to 1 percent slopes	650	750	65	85	60	75	-----	-----	3	4	3	2
Yahola very fine sandy loam, 1 to 3 percent slopes	600	700	60	80	60	75	-----	-----	3	4	3	2
Yahola very fine sandy loam, 3 to 8 percent slopes	550	600	50	70	55	70	-----	-----	2. 5	3. 5	3	2
Yahola very fine sandy loam, undulating	500	600	50	70	50	65	-----	-----	2. 5	3. 5	3	2

[1] Figures given are for common bermudagrass. Yields of Coastal bermudagrass are about twice these amounts under both common and improved management.

[2] Usually consists of bermudagrass or other warm-season grasses grown with clover or other cool-season legumes.

[3] Number of acres that will support an animal unit for 1 year. An animal unit is equivalent to 1 cow, steer, or horse; 5 hogs; or 7 sheep.

[4] Oats are often damaged by floods late in spring.

Woodlands

About 65.4 percent of the total land area of Bossier Parish is in commercial forest. This percentage tends to increase slightly each year as old fields on the Coastal Plain are planted to pine or reseed naturally. Not enough woodland on the Red River bottom lands is cleared each year to offset the acreage that is coming into forest on the Coastal Plain.

In 1945, pure stands of pine made up 32 percent of the woodland of the parish. Pure stands of hardwoods made up 42 percent, and 26 percent consisted of a mixture of pines and hardwoods.

Loblolly pine and shortleaf pine grow naturally on the Coastal Plain. Slash pine, which is not native to this area, has been planted since 1940. Its suitability has not yet been definitely established. The upland hardwoods that are grown with pines in the mixed pine-and-hardwood forest are southern red oak, water oak, willow oak, post oak, white oak, gum, hickory, and elm.

There are two general types of hardwood forest. One, which grows on the soils of the Red River bottom lands, consists of cherrybark oak, Shumard oak, Nuttall oak, overcup oak, water oak, pecan, hackberry, elm, and cypress. Almost pure stands of cottonwood and willow grow on the land type Riverwash, which is flooded frequently.

The other type, common along the creeks and bayous of the Coastal Plain, consists of nearly pure stands of hardwoods. The principal species are water oak, willow oak, cherrybark oak, sweetgum, and blackgum, and there are cypress and overcup oak in some places. A few almost pure stands of post oak, willow oak, and southern red oak grow also on the uplands or terraces.

Of the 351,900 acres of woodland in the parish, according to the 1954 Forest Survey (*15*), about 93,809 acres was farm woodland and 258,091 acres was nonfarm woodland. The size of woodland tracts ranges from a few acres to several thousand acres. Forty-eight percent of the woodland acreage belongs to owners who own less than 500 acres apiece. The number of owners and the size of their holdings were as follows (*8*):

Acres of woodland	*Number of owners*
Less than 500	3, 067
500 to 1,000	36
1,000 to 5,000	16
5,000 to 10,000	4
10,000 to 15,000	0
More than 15,000	4

TABLE 6.—*Site indexes and problems of timber*

Woodland suitability group[1]	Productivity				Hazards to production		
	Loblolly pine[2]		Shortleaf pine		Plant competition	Seedling morality	
	Site index	Variation coefficient[3]	Site index	Variation coefficient[3]		Slash pine plantings[4]	Loblolly pine Plantings
1	103±	3. 0	(6)	----------	Severe	Slight to moderate	Slight to moderate
2	90±	5. 9	83±	6. 2	Moderate	Slight	Slight
3	89±	1. 1	(7)	----------	Severe	Slight	Slight
4	85	0	(6)	----------	Severe	Severe	Severe
5	81±	4. 9	75±	5. 0	Moderate	Slight	Slight
6	79±	5. 5	75±	4. 2	Moderate	Slight	Slight
7	79±	2. 4	(7)	----------	Severe	Slight	Slight
8	77±	6. 6	68±	7. 7	Slight	Severe	Severe
9	73±	7. 3	68±	9. 6	Moderate	Moderate	Moderate
10	72±	5. 9	61±	7. 8	Moderate	Moderate	Moderate
11	71±	3. 0	(6)	----------	Severe	Moderate	Severe
12	59±	8. 9	49±	12. 4	Slight to severe	Severe	Severe

[1] The soils in each group are listed in the text under the heading of the appropriate woodland suitability group.

[2] Figures for loblolly pine may be used for slash pine. Studies in other parts of Louisiana indicate that growth rates of these species are comparable.

[3] Variation coefficient$=\frac{\text{standard deviation}}{\text{mean of items}}\times 100$.

[4] Slash pine does not grow naturally in Bossier Parish, but it is being extensively planted.

[5] Shortleaf pine is not being generally planted at present.

More than 32,000 acres of woodland in military reservations and in the Bodcau Reservoir flood control project are owned by the Federal Government. All of this is managed for the production of wood crops.

About 51 percent of the volume of standing timber in the parish is composed of softwoods, principally loblolly pine, shortleaf pine, and slash pine. The other 49 percent is composed of hardwoods, of which oaks and sweetgum are the most numerous.

Most of the pine woodlands and the mixed woodlands of pine and hardwoods are under some systematic plan of management. Many of the larger tracts are owned by corporations and managed by professional foresters. Cull trees and hardwoods of undesirable species have been deadened to allow young pines to grow. An estimated 15,000 acres of mixed woodlands of pine and hardwoods has been converted to almost pure stands of pine since 1950 by timber stand improvement practices.

The stands of hardwoods, both on the Coastal Plain and on the bottom lands of the Red River, have received less systematic management than either of the other types of woodland in Bossier Parish. Because of the diversity of species and site requirements, management of this type is much more complicated than that of the pine woodland or the pine-and-hardwood woodland. Most of the hardwood stands in the parish are of low quality. Most stands contain a high percentage of culls and low-quality trees that were left when the better quality trees were harvested. Most of the trees have been severely damaged by fire and by overgrazing.

Woodland Suitability Groupings

The soils of the parish differ in their ability to produce wood crops (*2, 3, 6, 13, 19, 20*). The management required for the most economical production of forest products differs from one soil to another.

The characteristics of the soil influence the productivity for wood crops, which is expressed as the site index; the potential difficulty of restocking, expressed as mortality of seedlings; the rate of encroachment by brush and weeds, expressed as plant competition; trafficability, expressed as limitation on the use of equipment; and hazard of erosion. Based on these items, a system for rating the soils of the Coastal Plain in Bossier Parish for loblolly pine, shortleaf pine, and slash pine has been developed by soil scientists and foresters of the Soil Conservation Service. Soils that have similar ratings make up a woodland suitability group. Twelve such groups are recognized in Bossier Parish. The soils in each group have similar problems and need similar woodland management. The ratings for each group are shown in table 6. Soils that are not suitable for commercial pine woodland are not included in the woodland suitability groups.

Seventy-nine samples of loblolly pine and forty-six samples of shortleaf pine stands were studied by soil scientists and foresters in Bossier and adjacent parishes. The soil in each area was sampled by spade or auger to identify the soil mapping unit and to make certain that the soil was uniform within the sampled stand. Three to five trees in each stand were measured. Tree height was determined with an Abney level and tape. Age was determined by taking increment borings and counting growth rings. The site index was determined from the revised site index curves for the respective species, as given by Coile and Schumacher in 1953 (*3*).

At the present time, not enough information is available to rate or to assign suitability groupings for commercially important species other than the loblolly pine and shortleaf pine. None of the planted stands of slash pine in this area are old enough for determination of the site index for this species. Observations and measurements on natural and planted stands in other parts of Louisiana indicate that the site index for loblolly pine can be used as a guide *production, by woodland suitability groups*

Hazards to production—Continued					
Seedling mortality—Continued		Limitations on use of equipment		Hazard of erosion on slopes of—	
Loblolly pine—Con. Natural reseeding	Shortleaf pine—natural reseeding 5	Kind	Degree	Less than 8 percent	More than 8 percent
Slight to moderate	(6)	Wetness	Moderate to severe	None	(8).
Slight	Slight	Slope	Slight to severe	Slight	Moderate.
Slight	Moderate	Wetness	Moderate	None	(8).
Severe	Severe	Wetness	Severe	None	(8).
Slight	Slight	Slope	Slight to severe	Slight	Moderate.
Slight	Slight	Slope; clay near surface	Moderate to severe	Moderate	Severe.
Slight	Moderate	Wetness	Moderate	Slight	(8).
Severe	Moderate	Slope; loose sand	Moderate to severe	Moderate	Severe.
Moderate	Slight	Slope; gravel and rock	Moderate to severe	Slight	Moderate.
Moderate	Moderate	Slope; plastic clay	Moderate to severe	Moderate	Severe.
Moderate	Severe	Wetness	Severe	None	(8).
Severe	Severe	Slope; sticky clay	Severe	Severe	Severe.

[6] Shortleaf pine does not normally grow on these soils.

[7] Not enough trees were found on these soils for sampling.

[8] This group contains no soils that have slopes of more than 8 percent.

to the site index for slash pine. Information is also lacking for the soils and important tree species on the bottom lands of the Red River.

The potential productivity of the soils for commercial woodland is indicated by the average site index of well-stocked, even-aged stands of pine under normal growing conditions. When soils are rated for woodland site quality, the site index is generally accepted as the best indicator of forest yields.

The site index is the average height of the dominant trees in the stand at 50 years of age. Only well-stocked, even-aged forest stands, normal in appearance and 30 or more years of age, were sampled. These stands had been cut and thinned to some extent, and it was necessary to determine that harvesting had not removed the dominant or codominant trees.

Plant competition is the rate at which undesirable or unwanted species of trees, brush, and weeds invade different soils when there are adequate sources of such invading plants. Competition is rated as slight, moderate, or severe. After undesirable plants have been removed by clearing, cultivation, fire, girdling, poisoning, or other methods, these rating classes do not apply.

Seedling mortality is the likelihood that tree seedlings will die during the first few years of growth. It is rated as slight, moderate, or severe. For planted seedlings, the ratings apply when the planting stock is of the proper grade and in a healthy condition when planted and the seedlings are properly planted. For naturally reseeded trees, the ratings apply when there is an adequate seed supply. For both natural and planted seedlings, it is assumed that the seedlings will not be seriously damaged by such pests as gophers and rabbits. Although pocket gophers are more common on some soils than on others, the soils are not rated according to pest damage, because other factors of cover and food supply also affect the numbers of such animals. It is also assumed that plant competition from unwanted species will be controlled and that other factors of the environment, exclusive of soil, will be normal.

Limitations on the use of equipment are rated as slight, moderate, or severe. Some characteristics of the soil, including slope, drainage, stoniness, and slipperiness, may be such as to restrict or prohibit the use of equipment commonly used in planting, crop tending, and tree harvesting. Some of the problems are seasonal, and others last all year long. These ratings are only a general guide, because the type of equipment used in woodland varies, and the weather conditions vary also.

The hazard of erosion is an estimate of the likelihood that enough erosion will occur to damage the quality of the site, to endanger roads, bridges, or other structures, or to produce excessive sediment, even though the woodland is managed according to currently acceptable standards. The hazard of erosion is rated as none, slight, moderate, or severe.

Woodland suitability group 1

These are better drained alluvial soils on bottom lands in the Coastal Plain. They are likely to be flooded, especially during the winter and spring.

The soils in this group are—

Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes.
Mantachie very fine sandy loam.
Mixed alluvial land.
Ochlockonee and Iuka sandy loams.

The average site index for loblolly pine is 103. Shortleaf pine does not grow naturally on these soils and is generally not suited to them.

The degree of plant competition from various species of hardwoods, after the overstory has been removed, is severe. Natural regeneration cannot be relied upon to restock these areas adequately. It is generally necessary to prepare the site for planting and to control competing vegetation.

Mortality of both planted and natural seedlings, when competition from other plants is controlled, is slight to moderate. Most of the destruction of seedlings is caused by floods. Mortality varies with the depth of the floodwater and the length of the flood period. Satisfactory stocking from the initial planting can be expected in 3 or 4 years out of 5. Some replanting may be necessary in low areas.

The limitation on the use of equipment is moderate to severe, depending on drainage and the hazard of flooding. The limitation usually exists during certain seasons only.

Erosion is not a problem if the woodland is managed according to currently acceptable standards.

Woodland suitability group 2

These are well-drained soils that have a moderately sandy, permeable subsoil and that lie on uplands and terraces.

The soils in this group are—

Amite fine sandy loam, 1 to 5 percent slopes.
Amite fine sandy loam, 1 to 5 percent slopes, eroded.
Amite fine sandy loam, 5 to 8 percent slopes, eroded.
Amite fine sandy loam, 8 to 20 percent slopes, eroded.
Amite fine sandy loam, thick surface, 1 to 5 percent slopes.
Amite soils, 5 to 20 percent slopes, severely eroded.
Cahaba fine sandy loam, 1 to 5 percent slopes.
Cahaba fine sandy loam, 1 to 5 percent slopes, eroded.
Cahaba fine sandy loam, 5 to 8 percent slopes, eroded.
Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded.
Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes.
Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes.
Kalmia very fine sandy loam, 0 to 1 percent slopes.
Orangeburg fine sandy loam, 1 to 5 percent slopes.
Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded.
Orangeburg fine sandy loam, 5 to 8 percent slopes.
Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded.
Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded.
Ruston fine sandy loam, 1 to 5 percent slopes.
Ruston fine sandy loam, 1 to 5 percent slopes, eroded.
Ruston fine sandy loam, 5 to 8 percent slopes.
Ruston fine sandy loam, 5 to 8 percent slopes, eroded.
Tilden very fine sandy loam, 0 to 1 percent slopes.
Tilden very fine sandy loam, 1 to 5 percent slopes.
Tilden very fine sandy loam, 1 to 5 percent slopes, eroded.
Tilden soils, 1 to 8 percent slopes, severely eroded.

The average site index for loblolly pine is 90, and the average for shortleaf pine is 83.

Plant competition from unwanted species, after the overstory has been removed, is moderate. The establishment of seedlings may be delayed, and their rate of growth may be slowed. This competition does not ordinarily prevent the establishment of an adequate stand of the designated species of trees, but some preparation of the site and some control of unwanted species may be necessary to prevent delay in establishment.

When plant competition is controlled, mortality of both planted and natural seedlings is slight. Satisfactory stocking from the initial planting can be expected 4 years out of 5. Ordinarily, an adequate stand will be established by natural reseeding.

On slopes of less than 8 percent, there are no special limitations on the use of equipment. On slopes of more than 8 percent, the choice of mechanical equipment that can be operated easily is more restricted. Where slopes are more than 16 percent, the limitations on the use of equipment are severe. Neither drainage nor the texture of the soil limits the use of equipment.

The hazard of erosion is slight on slopes of less than 8 percent. On slopes of more than 8 percent, the hazard of erosion is moderate. On these steeper slopes, the construction and maintenance of roads, skid trails, fire lanes, and banking areas may require special management to prevent damaging erosion.

Woodland suitability group 3

These are somewhat poorly drained soils that do not have heavy clay in the subsoil and that lie on uplands and terraces.

The soils in this group are—

Pheba complex, mounded, 0 to 3 percent slopes.
Pheba very fine sandy loam, 0 to 3 percent slopes.
Prentiss complex, mounded, 0 to 1 percent slopes.
Prentiss complex, mounded, 1 to 5 percent slopes.
Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes.
Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes.
Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded.
Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes.
Stough complex, mounded, 0 to 1 percent slopes.
Stough silt loam, 0 to 3 percent slopes.
Stough silt loam, clay substratum, 0 to 1 percent slopes.
Stough silt loam, clay substratum, 1 to 3 percent slopes.

The average site index for loblolly pine is 89. The estimated site index for shortleaf pine is 80.

The degree of plant competition from undesirable or unwanted species is severe after the overstory has been removed. Natural regeneration cannot always be relied upon to restock the area adequately. Special management may be necessary to prepare the site in advance and to control undesirable species.

When plant competition is controlled, mortality of both planted and natural seedlings of loblolly pine is slight. Natural reseeding will ordinarily establish a stand. Satisfactory stocking from an initial planting can be expected 4 years out of 5.

Seedlings of shortleaf pine do not seem to tolerate wetness as well as those of loblolly pine. The mortality of seedlings of shortleaf pine is moderate. Natural reseeding cannot always be relied upon, even after plant competition is controlled.

The moderate limitation on the use of equipment is due principally to wetness of the soil. The structure and stability of these soils may be damaged if they are wet when heavy equipment is used on them.

Erosion is not a problem if the woodland is managed according to currently accepted standards. Some sloughing and caving into road drains and around culverts is likely. Where filling is necessary to construct roads across these soils, special care is needed.

Woodland suitability group 4

These are poorly drained alluvial soils on bottom lands on the Coastal Plain. Most of them are rather frequently flooded and may be under water for several days at a time.

The soils in this group are—

Bibb silt loam.
Bibb, Myatt, and Stough silt loams, overflow.

Mixed wet alluvial land.
Myatt-Stough complex, overflow.

Loblolly pine generally grows on ridges that are small inclusions of the better drained alluvial soils. The average site index for loblolly pine is 85. Shortleaf pine does not grow naturally on these soils.

Plant competition from hardwood seedlings, after the overstory has been removed, is severe. Natural regeneration cannot be relied upon to provide adequate restocking of pine. Special preparation of the site and control of unwanted species are necessary. Because of the difficulty of establishing a full stand of pine, the management of desirable species of hardwoods or of a mixed stand of pines and hardwoods should be considered.

The mortality rate for both planted and natural seedlings of pine, even when plant competition is controlled, is severe during the first few years. Poor drainage, wet soil, and flooding kill a considerable number of seedlings. Satisfactory restocking of pine from the initial planting can be expected in only about 2 years out of 5. In most instances, considerable replanting is necessary to establish a stand of pine.

The use of equipment is severely limited by the wet soil and the hazard of flooding. High-quality roads need to be built for the use of equipment.

Erosion is not a problem on these soils when the woodlands are managed according to currently acceptable standards.

Woodland suitability group 5

These are well-drained soils that have a heavy, slowly permeable subsoil and that lie on uplands and terraces.

The soils in this group are—

Kirvin fine sandy loam, 1 to 5 percent slopes, eroded.
Kirvin fine sandy loam, 5 to 8 percent slopes, eroded.
Kirvin fine sandy loam, 8 to 30 percent slopes.
Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded.
Luverne fine sandy loam, 1 to 5 percent slopes, eroded.
Luverne fine sandy loam, 5 to 8 percent slopes, eroded.
Luverne fine sandy loam, 8 to 20 percent slopes, eroded.
Luverne loamy fine sand, thick surface, 1 to 5 percent slopes.
Luverne loamy fine sand, thick surface, 5 to 8 percent slopes.
Prentiss very fine sandy loam, 0 to 1 percent slopes.
Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes.
Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded.
Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes.
Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded.
Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes.
Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes, eroded.
Ruston soils, 1 to 8 percent slopes, severely eroded.
Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes.
Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded.
Shubuta fine sandy loam, 1 to 5 percent slopes.
Shubuta fine sandy loam, 1 to 5 percent slopes, eroded.
Shubuta fine sandy loam, 5 to 8 percent slopes.
Shubuta fine sandy loam, 5 to 8 percent slopes, eroded.
Shubuta fine sandy loam, 8 to 16 percent slopes, eroded.
Vaucluse loamy fine sand, 1 to 5 percent slopes.
Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded.
Vaucluse loamy fine sand, 5 to 8 percent slopes.
Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded.
Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded.

The average site index for loblolly pine is 81, and the average site index for shortleaf pine is 75.

Plant competition from undesirable species, after the overstory has been removed, is moderate. Competition delays the establishment of seedlings and slows their rate of growth, but ordinarily it does not prevent the establishment of an adequate stand of the designated species. Some preparation of the site may be necessary to establish an adequate stand without delay.

If plant competition is controlled during the first few years of growth, the mortality of both planted and natural seedlings is slight (fig. 10). Satisfactory restocking from the initial planting can be expected about 4 years out of 5. Ordinarily, natural reseeding will restock these areas adequately.

Limitations on the use of equipment are slight to severe, depending principally on slope. Operation of mechanical equipment becomes more difficult as the slope increases. On steep slopes, road construction and maintenance are difficult.

On slopes of less than 8 percent, the hazard of erosion is slight. On slopes of more than 8 percent, the hazard is moderate. Special management is needed in construction and maintenance of roads, skid trails, fire lanes, and banking areas to prevent erosion.

Woodland suitability group 6

These are well-drained soils that have a very slowly permeable subsoil of heavy clay and that lie on uplands and terraces.

The soils in this group are—

Boswell fine sandy loam, 1 to 5 percent slopes, eroded.
Boswell fine sandy loam, 5 to 8 percent slopes, eroded.
Boswell fine sandy loam, 8 to 20 percent slopes, eroded.
Hortman very fine sandy loam, 1 to 5 percent slopes, eroded.
Hortman very fine sandy loam, 5 to 8 percent slopes, eroded.
McKamie very fine sandy loam, 1 to 5 percent slopes.
McKamie very fine sandy loam, 1 to 5 percent slopes, eroded.
McKamie very fine sandy loam, 5 to 8 percent slopes, eroded.
McKamie and Hortman soils, 8 to 20 percent slopes.
Muskogee silt loam, 1 to 5 percent slopes.
Muskogee silt loam, 1 to 5 percent slopes, eroded.

The average site index for loblolly pine is 79, and that for shortleaf pine is 75.

Plant competition from unwanted species is moderate, after the overstory has been removed. The competition may delay the establishment of a stand of pines and slow its rate of growth, but ordinarily it does not prevent the establishment of a good stand of the desired species. Some preparation of the site may be necessary to establish an adequate stand without delay.

When plant competition is controlled, the mortality of both natural and planted seedlings of pine is slight. Ordinarily, the areas can be restocked by natural reseeding. Satisfactory restocking from the initial planting can be expected 4 years out of 5.

The use of equipment is limited principally by the plastic clay layer near the surface of these soils. On slopes of less than 8 percent, the limitation is moderate, but on slopes of more than 8 percent, the limitation is severe. Fairly high-quality roads are needed for the use of equipment.

The hazard of erosion is moderate on slopes of less than 8 percent and severe on slopes of more than 8 percent. Some provision is needed to prevent erosion during the construction and maintenance of roads, skid trails, fire lanes, and banking areas.

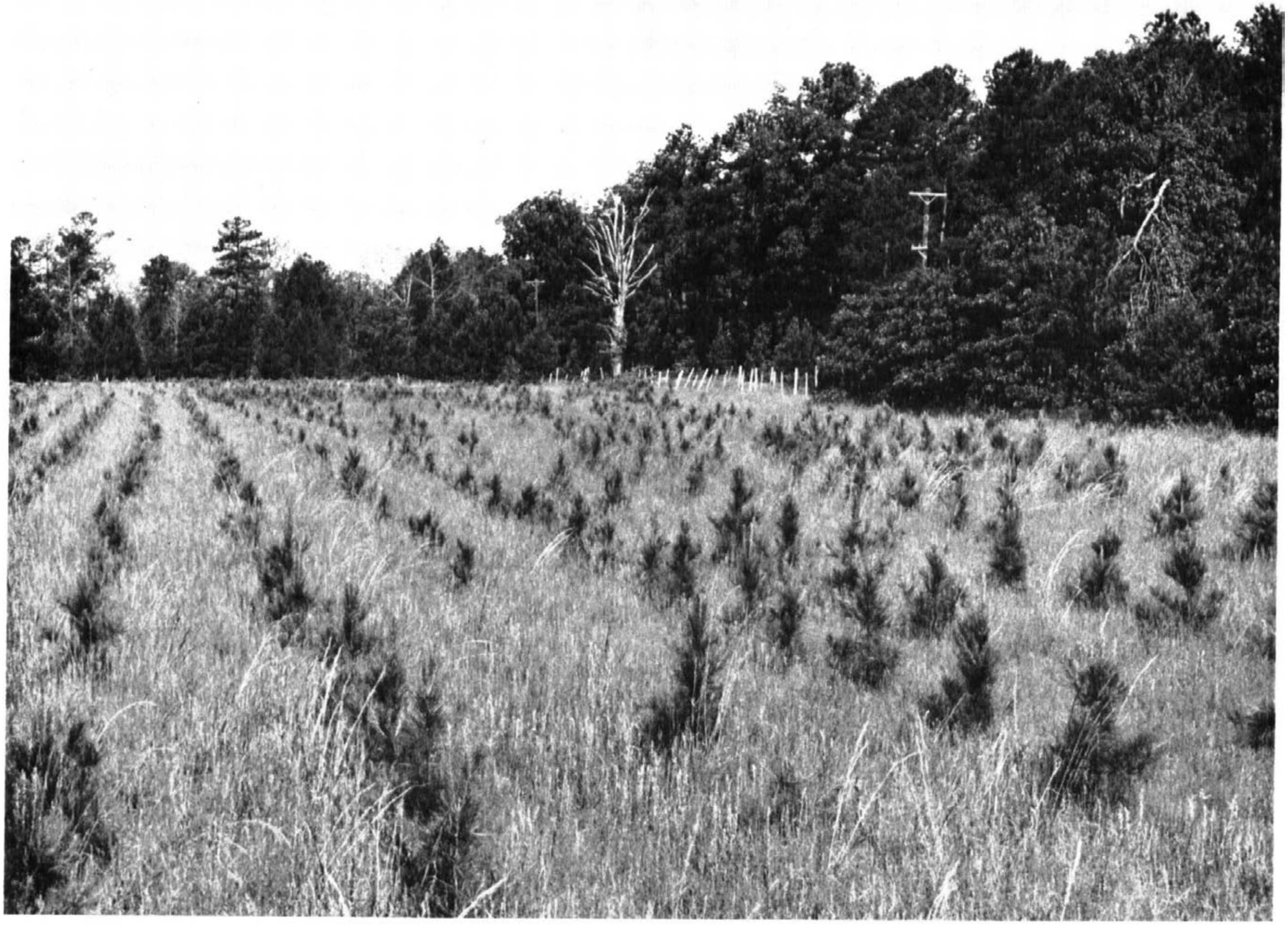

***Figure 10.*—Three-year-old planting of loblolly pine on formerly cultivated field of Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded.**

Woodland suitability group 7

These are somewhat poorly drained soils that have a very slowly permeable subsoil of heavy clay and that lie on uplands and terraces.

The soils in this group are—

Acadia complex, mounded, 0 to 3 percent slopes.
Acadia silt loam, 0 to 1 percent slopes.
Acadia silt loam, 1 to 3 percent slopes.
Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes.
Muskogee complex, mounded, 1 to 3 percent slopes.
Sawyer fine sandy loam, 1 to 5 percent slopes.
Sawyer fine sandy loam, 1 to 5 percent slopes, eroded.

The average site index for loblolly pine is 79. The estimated site index for shortleaf pine is 74.

After the overstory has been removed, plant competition from unwanted species is severe. Natural reseeding cannot always be relied upon to restock the areas adequately. It may be necessary to prepare the site and to control unwanted species by special management.

When plant competition is controlled, the mortality for both planted and natural seedlings of loblolly pine and slash pine is slight. Satisfactory stocking from the initial planting can be expected 4 years out of 5. Ordinarily, these areas will be reseeded naturally. The mortality of shortleaf pine seedlings is moderate. Even when plant competition is controlled, a full stand of shortleaf pine cannot always be established immediately by natural reseeding.

The use of equipment is moderately limited by wetness of the soil. If heavy equipment is used when these soils are wet, damage to the structure and stability of the soil may result.

Erosion is not a problem if the woodland is managed according to currently acceptable standards.

Woodland suitability group 8

These are well-drained, moderately coarse textured, rapidly permeable sands.

The soils in this group are—

Huckabee loamy fine sand, 1 to 5 percent slopes.
Huckabee loamy fine sand, 5 to 20 percent slopes.
Independence loamy fine sand, 0 to 1 percent slopes.

Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes.
Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes.
Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes.
Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded.

The average site index for loblolly pine is 77, and that for shortleaf pine is 68.

After the overstory has been removed, plant competition from noncommercial species is slight. The natural regeneration and growth of designated species will be only slightly impeded by the invasion of other vegetation.

The mortality of planted seedlings is severe because of the low moisture-holding capacity of these soils. Special preparation of the seedbed, very careful planting techniques, and considerable replanting will be necessary for adequate and immediate restocking. Satisfactory stocking from the initial planting can be expected only about 2 years out of 5. Natural reseeding cannot be relied upon to establish a full stand immediately. The mortality for natural seedlings is moderate for shortleaf pine and severe for loblolly pine.

The limitation on the use of equipment is moderate on slopes of less than 8 percent and severe on slopes of more than 8 percent. Loose sand, especially during dry periods, interferes with the traction of wheeled equipment and with the planting of seedlings. The traction problems increase with the slope.

The hazard of erosion is moderate on slopes of less than 8 percent and severe on slopes of more than 8 percent. It results from the concentration of runoff in skid trails, roads, fire lanes, tracks of wheeled equipment, and other disturbed areas of soil. These soils gully easily. Care should be taken to prevent concentration of runoff if possible. Safe disposal of water should be provided where runoff does concentrate.

Woodland suitability group 9

These are well-drained soils that contain appreciable amounts of ironstone and sandstone gravel and that lie on uplands.

The soils in this group are—

Kirvin gravelly fine sandy loam, 1 to 5 percent slopes.
Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded.
Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded.
Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded.
Luverne gravelly fine sandy loam, 1 to 5 percent slopes.
Luverne gravelly fine sandy loam, 5 to 8 percent slopes.
Luverne soils, 1 to 20 percent slopes, severely eroded.
Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded.
Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded.
Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded.
Nacogdoches soils, 5 to 30 percent slopes, severely eroded.
Shubuta gravelly fine sandy loam, 1 to 5 percent slopes.
Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded.
Shubuta gravelly fine sandy loam, 5 to 8 percent slopes.
Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded.
Shubuta gravelly fine sandy loam, 8 to 20 percent slopes.
Shubuta soils, 5 to 30 percent slopes, severely eroded.
Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded.
Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes.

The average site index for loblolly pine is 73, and the site index for shortleaf pine is 68.

Plant competition is moderate. Invasion of the site by unwanted species does not ordinarily prevent the establishment of an adequate stand of the trees wanted. Some preparation of the site and control of competing plants may be necessary to establish an adequate stand immediately. Competition may delay establishment and slow the rate of growth of the wanted species.

The mortality of planted seedlings of loblolly pine or slash pine is moderate, because of the rather low moisture-holding capacity of the surface layer of these soils. Some replanting may be necessary, but satisfactory restocking from the initial planting can be expected 3 years out of 5. The mortality of natural seedlings is moderate for loblolly pine and slight for shortleaf pine. Most naturally reseeded stands on these soils contain a high percentage of shortleaf pine.

The limitation on the use of equipment is moderate on slopes of less than 8 percent. In some areas, the soil contains enough gravel to make tree planting by machine rather difficult. On slopes of more than 8 percent, the limitation on use of wheeled equipment is severe because of the added factor of slope.

The hazard of erosion is slight on slopes of less than 8 percent and moderate on slopes of more than 8 percent. Although these soils do not erode easily, even on the steeper slopes, some provision for control of erosion is needed in roads, banking areas, fire lanes, and other disturbed areas.

Woodland suitability group 10

These soils have heavy plastic clay near the surface and lie on uplands and terraces.

The soils in this group are—

Boswell sandy clay, 5 to 8 percent slopes, severely eroded.
Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded.
Gore very fine sandy loam, 1 to 5 percent slopes.
Gore very fine sandy loam, 1 to 5 percent slopes, eroded.
Gore very fine sandy loam, 5 to 16 percent slopes, eroded.
Muskogee soils, 1 to 8 percent slopes, severely eroded.
Susquehanna fine sandy loam, 1 to 8 percent slopes.
Susquehanna soils, 8 to 30 percent slopes, eroded.
Susquehanna soils, 5 to 30 percent slopes, severely eroded.

The average site index for loblolly pine is 72, and for shortleaf pine the index is 61.

Plant competition, after the overstory has been removed, is moderate. Competition may delay the establishment and slow the rate of growth of the wanted species, but it does not ordinarily prevent the establishment of an adequate stand. Some preparation of the site and control of competing plants are necessary in many places to hasten the establishment of an adequate stand.

When plant competition is controlled, the mortality of both planted and natural seedlings is moderate. Some replanting may be necessary, but satisfactory stocking from the initial planting can be expected 3 years out of 5. Preparation of a good seedbed will help natural reseeding.

The use of equipment is moderately limited on slopes of less than 8 percent and severely limited on slopes of more than 8 percent. These soils are not very stable when they are wet, and they easily become rutted. When unsurfaced roads are wet, they are sticky and difficult to travel over with wheeled vehicles. The steeper slopes also limit the use of equipment.

On slopes of less then 8 percent, the hazard of erosion is moderate. Some provision is necessary to prevent erosion in roads, fire lanes, banking areas, and other areas where the soil is disturbed. The hazard of erosion is severe on slopes of more than 8 percent, and special measures to control and dispose of runoff water should be provided for all disturbed areas. High-quality roads are needed for travel in wet weather.

Woodland suitability group 11

These are poorly drained soils that have a very slowly permeable subsoil.

The soils in this group are—

Myatt complex, mounded.
Myatt silt loam.
Wrightsville complex, mounded.
Wrightsville silt loam.
Wrightsville silty clay.

The average site index for loblolly pine is 71. Shortleaf pine is not generally suited to these soils and rarely grows on them.

After the overstory has been removed, plant competition is severe (fig. 11). The water-tolerant species—water oak, willow oak, post oak, and gum trees—are the chief competition of the pines. Preparation of the site and control of competing vegetation may be necessary, since natural reseeding cannot always be relied upon to restock these areas to an adequate stand of pines.

The mortality of natural seedlings of loblolly pine is moderate, but that of planted seedlings of loblolly pine is severe. Planted seedlings of slash pine have a moderate mortality. The mortality of natural seedlings of shortleaf pine is severe. The mortality of seedlings depends somewhat on the surface drainage and standing water. In depressions and ponded areas, the mortality of pine seedlings, both planted and naturally reseeded, is normally severe.

The limitation on the use of equipment is severe during winter, spring, and the later part of autumn, because of the wetness of the soil (fig. 12). Equipment can be used only during the drier part of the year. High-quality roads are needed for travel in wet weather.

Erosion is not a special problem on these soils.

Woodland suitability group 12

These are alkaline, clay-textured soils that crack deeply during dry periods.

The soils in this group are—

Morse clay, 1 to 5 percent slopes, eroded.
Morse clay, 5 to 8 percent slopes, eroded.
Morse clay, 8 to 20 percent slopes, eroded.
Morse clay, 3 to 8 percent slopes, severely eroded.
Morse clay, dark surface, 1 to 5 percent slopes.
Morse clay, dark surface, 1 to 5 percent slopes, eroded.

The average site index for loblolly pine is 59, and that for shortleaf pine is 49.

Plant competition varies. Some of these areas in their natural state were almost like prairie or savannah and had only a scattering of forest trees. Pine rarely grows on them. Other areas supported a sparse stand of post oak, honey locust, ash, and hawthorn, and a few pines. The competition from shrubs and undesirable trees—for example, hawthorn, locust, and elm—ranges from slight to severe. Natural restocking to pine is rare.

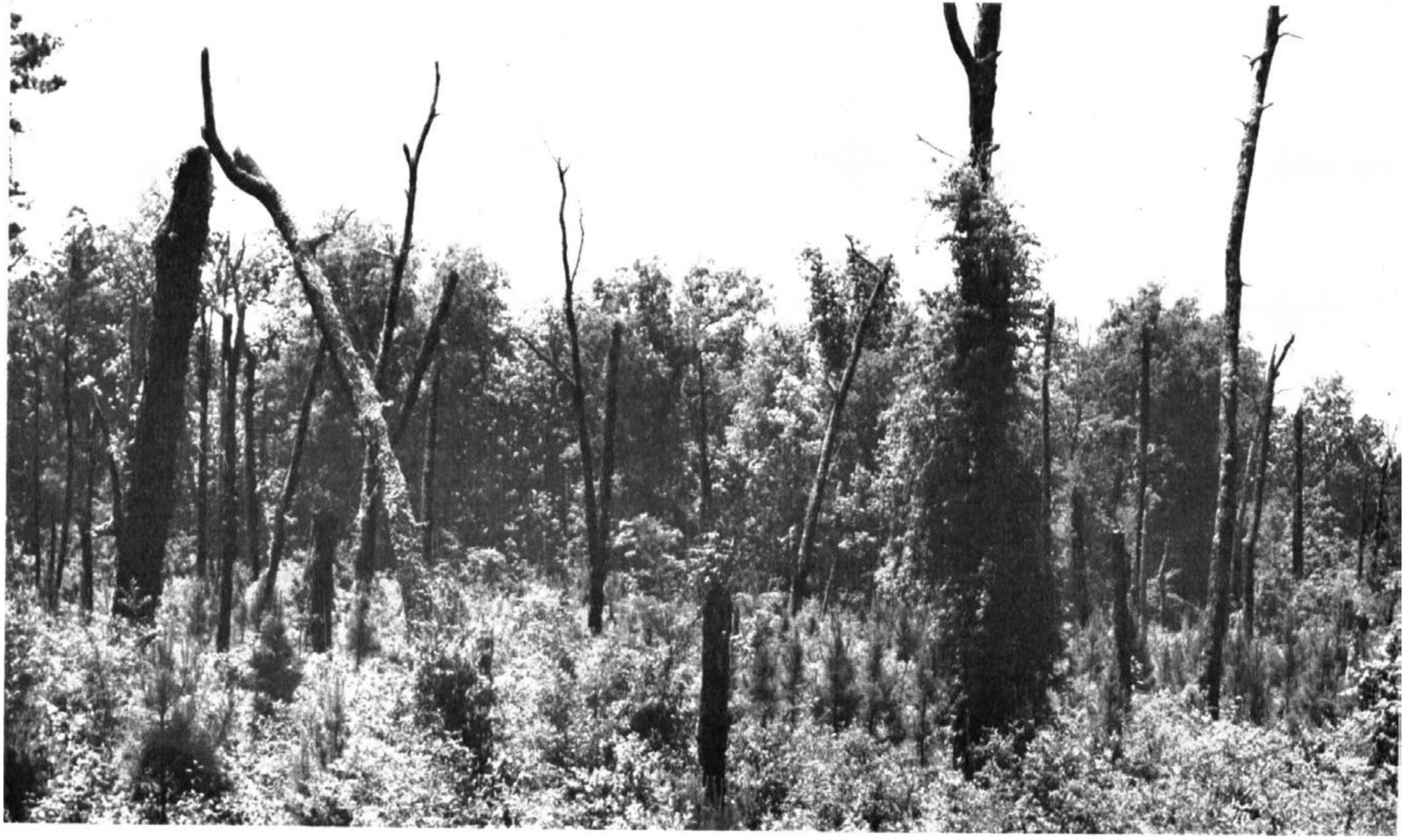

Figure 11.—**Three-year-old planting of slash pine on Wrightsville silt loam after larger trees have been deadened. Competition from willow oak seedlings is severe.**

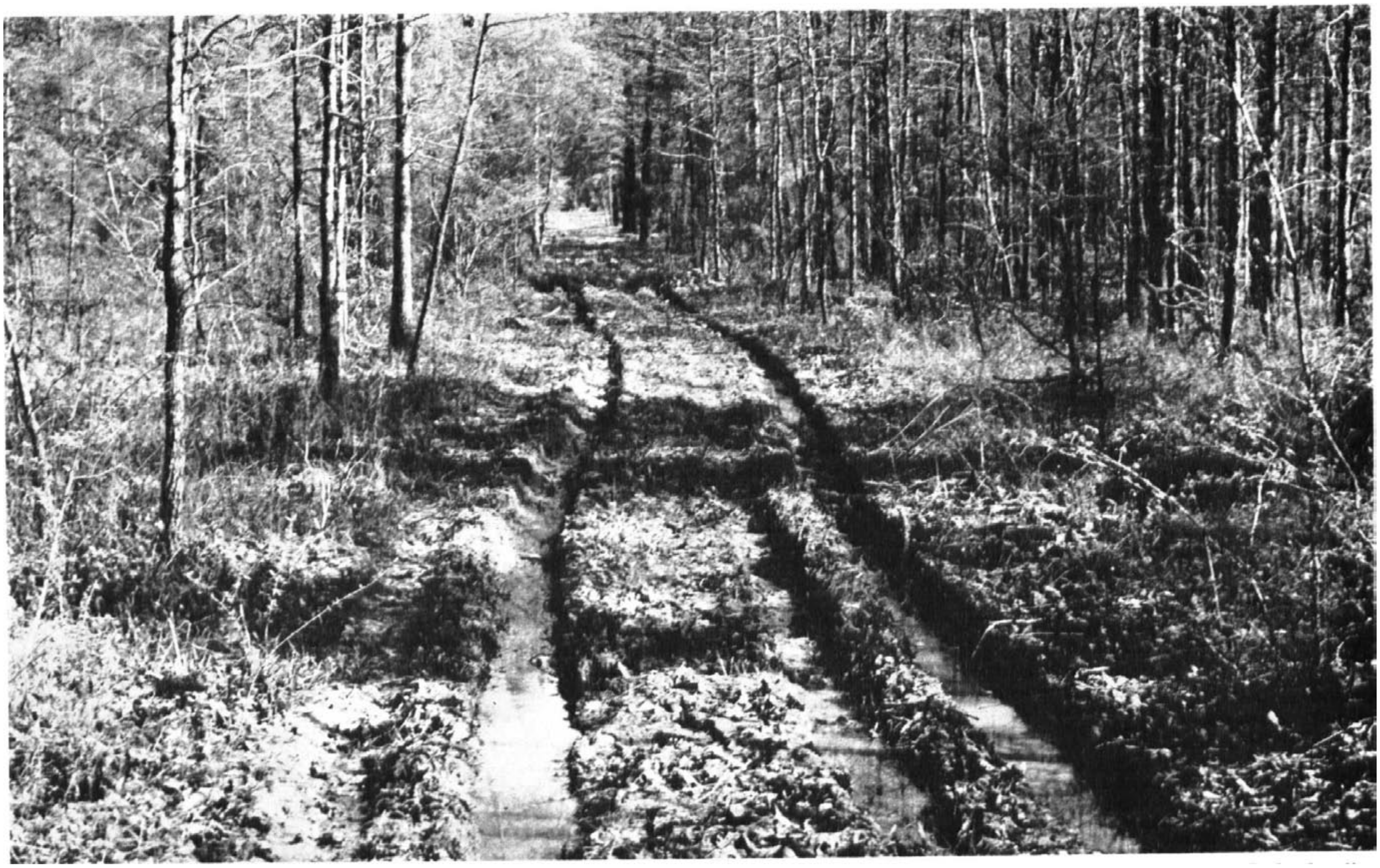

***Figure 12.*—The use of logging equipment is severely restricted by wetness on Wrightsville silt loam. These ruts were made by hauling one load of logs.**

TABLE 7.—*Yield and other information for planning management for loblolly pine, slash pine, and shortleaf pine*

	Site index						
	50	60	70	80	90	100	110
Approximate length of sawlog rotation *years*	72	67	62	58	54	52	50
Approximate diameter of crop trees at end of rotation *inches*	19	19. 9	20. 8	21. 5	22. 5	23. 0	23. 5
Approximate age at which first thinning of trees 6 inches or more in diameter can be expected *years*	15	15	14	13	12	12	11
Cutting cycle for recurring thinnings to a required spacing *years*	9	8	7	6	5	5	5

Even when plant competition is controlled, mortality of both planted and natural seedlings of pine is severe and often extends into the third growing season. Special preparation of the seedbed and superior planting techniques are necessary. Satisfactory stocking from the initial planting can be expected only about 1 year out of 5. Little planting of pine has been done on these soils.

The limitation on the use of equipment is severe. Equipment can be used only when moisture conditions are favorable, because the clay is so plastic and sticky when wet.

The hazard of erosion is severe. Special techniques and care are necessary to prevent erosion in roads, fire lanes, banking areas, and other disturbed areas.

Yields from Woodlands

Information that will help in planning the management of soils of various site indexes for pine is given in table 7. Information on the average size and yield of pine on soils of various site indexes is given in tables 8 and 9.

Origin and Classification of Soils

Formation of Soils in Bossier Parish

Soil is formed by the interaction of climate, parent material, living organisms, topography, and time. The characteristics of the soil depend upon the combination of these five major factors. The relative importance of each factor differs from place to place. In extreme cases, one factor

TABLE 8.—*Average size and yield of well-stocked, unmanaged, naturally occurring stands of loblolly pine (14)*

Site index	Age	Volume per acre			Height of dominant trees in stand [1]	Average diameter of total stand	Trees per acre
	Years	*Cu. ft.*	*Cords*	*Bd. ft.* [2]	*Feet*	*Inches*	*Number*
60	20	1, 500	12	--------	35	3. 6	1, 600
	30	2, 750	25	--------	48	5. 4	850
	40	3, 700	35	1, 000	55	6. 8	585
	50	4, 300	41	3, 000	60	7. 9	440
	60	4, 700	46	5, 000	64	8. 9	360
	70	5, 000	49	7, 000	67	9. 7	310
	80	5, 200	51	8, 500	69	10. 4	275
70	20	1, 900	17	--------	42	4. 3	1, 185
	30	3, 350	21	1, 000	55	6. 5	640
	40	4, 500	42	3, 500	64	8. 1	435
	50	5, 200	50	6, 500	70	9. 4	325
	60	5, 700	55	10, 000	75	10. 6	270
	70	6, 000	59	12, 500	78	11. 5	230
	80	6, 200	62	15, 000	80	12. 3	205
80	20	2, 350	22	--------	48	5. 0	950
	30	4, 000	38	2, 000	63	7. 4	510
	40	5, 300	51	6, 000	73	9. 2	345
	50	6, 150	60	11, 500	80	10. 7	255
	60	6, 650	66	16, 000	85	12. 0	210
	70	7, 000	70	19, 500	89	13. 1	185
	80	7, 300	73	22, 000	92	14. 0	160
90	20	2, 850	27	--------	54	5. 6	790
	30	4, 700	46	4, 000	71	8. 2	420
	40	6, 200	61	10, 000	82	10. 2	290
	50	7, 200	71	16, 500	90	12. 0	220
	60	7, 800	78	22, 000	96	13. 4	180
	70	8, 200	82	26, 000	100	14. 6	150
	80	8, 550	85	29, 000	103	15. 6	135
100	20	3, 300	32	500	59	6. 1	690
	30	5, 400	53	6, 000	78	9. 0	375
	40	7, 150	71	14, 500	91	11. 2	255
	50	8, 400	84	23, 000	100	13. 1	190
	60	9, 150	92	29, 500	107	14. 6	155
	70	9, 600	96	33, 000	112	15. 9	135
	80	9, 950	100	35, 500	115	17. 1	115
110	20	3, 850	37	1, 000	65	6. 6	615
	30	6, 200	62	9, 000	85	9. 7	335
	40	8, 200	82	20, 000	100	12. 1	225
	50	9, 650	96	29, 500	110	14. 1	170
	60	10, 550	106	36, 500	118	15. 9	140
	70	11, 150	112	40, 500	122	17. 3	120
	80	11, 500	116	43, 500	126	18. 4	105

[1] Revised according to Coile and Schumacher (*3*).
[2] Doyle scale.

TABLE 9.—*Average size and yield of well-stocked, unmanaged, naturally occurring stands of shortleaf pine (14)*

Site index	Age	Volume per acre			Height of dominant trees in stand [1]	Average diameter of total stand	Trees per acre
	Years	*Cu. ft.*	*Cords*	*Bd. ft.* [2]	*Feet*	*Inches*	*Number*
50	20	1, 350	------	--------	32	2. 5	3, 425
	30	2, 460	23	--------	39	3. 9	1, 855
	40	3, 390	33	--------	46	5. 1	1, 085
	50	4, 070	43	1, 600	50	6. 1	760
	60	4, 500	48	3, 200	55	6. 9	590
	70	4, 820	51	5, 050	59	7. 6	485
	80	5, 090	53	7, 000	62	8. 3	420
60	20	1, 720	12	--------	37	2. 9	2, 520
	30	3, 140	32	--------	47	4. 6	1, 370
	40	4, 300	46	1, 550	54	6. 0	815
	50	5, 150	54	4, 350	60	7. 2	570
	60	5, 720	60	7, 600	66	8. 2	445
	70	6, 180	65	10, 250	71	9. 0	370
	80	6, 530	68	12, 700	74	9. 8	315
70	20	2, 120	18	--------	43	3. 5	1, 965
	30	3, 900	41	750	53	5. 4	1, 060
	40	5, 290	56	4, 000	62	7. 0	625
	50	6, 300	66	8, 650	70	8. 3	440
	60	7, 030	73	12, 600	77	9. 4	345
	70	7, 600	79	16, 250	82	10. 4	285
	80	8, 030	83	19, 400	86	11. 2	240
80	20	2, 540	25	--------	50	4. 1	1, 495
	30	4, 510	48	1, 950	62	6. 2	815
	40	6, 150	65	7, 650	72	8. 0	485
	50	7, 400	77	13, 550	80	9. 5	335
	60	8, 270	85	18, 850	88	10. 8	260
	70	8, 930	92	23, 450	94	11. 9	215
	80	9, 480	97	27, 550	99	12. 9	185
90	20	2, 820	30	--------	56	5. 0	1, 080
	30	5, 120	54	4, 550	70	7. 3	590
	40	7, 050	73	12, 600	81	9. 4	345
	50	8, 490	87	20, 450	90	11. 2	245
	60	9, 510	98	27, 400	99	12. 8	185
	70	10, 300	105	32, 850	106	14. 1	160
	80	10, 920	112	37, 400	111	15. 3	140

[1] Revised according to Coile and Schumacher (*3*).
[2] Doyle scale.

may dominate the formation of the soil and fix most of its properties.

The five factors of soil formation, as they affected the soils in Bossier Parish, are described in this section. Also included is a discussion of the Red River raft, which caused changes in the pattern of drainage and deposition and thereby affected the formation of soils, and a description of the sandy mounds that are common features of some of the soils of Louisiana and nearby States.

Climate

The climate of Bossier Parish is the humid, warm-temperate, continental type that is characteristic of the southeastern United States. The average temperature and rainfall, by seasons and months, are shown in table 3 on page 4. Over the parish, the climate has been a uniform factor in soil development.

The mature Red-Yellow Podzolic soils are typical of soils on which such a climate has been operating over a long period of time.

The young Alluvial soils that formed from sediments deposited by the Red River have been little affected by the local climate. Time has not yet permitted much weathering of the sediments in place, and the sediments themselves have come mostly from sections where weathering is not intense. Thus, these young soils have many characteristics of soils of drier climates.

Many of the soils that developed from old alluvium of Pleistocene age are intermediate in development between the older Red-Yellow Podzolic soils and the young Red River Alluvial soils. Many of these, particularly those developed in fine-textured sediments, are medium to high in bases, especially in the lower layers. The parent material is only moderately leached and retains most of its original chemical and mineralogical characteristics.

Parent material

Parent material is the unconsolidated mass from which a soil forms. It determines the limits of the chemical and mineralogical composition of the soil. In Bossier Parish most of the soils formed in one of three kinds of parent material: Gulf Coastal Plain sedimentary deposits, old alluvium deposited chiefly by an ancestral Red River, and recently deposited Red River alluvium.

The Gulf Coastal Plain sedimentary deposits consist of beds of material that ranges in texture from sand to clay. They are generally acid and highly leached. They are old deposits of Tertiary age, laid down in former extensions of the Gulf of Mexico.

The old alluvium from which the extensive stream terraces formed is of Pleistocene age. Sandy, permeable, old natural levee deposits have been leached and are commonly acid. The clay is dominantly montmorillonite. Fine-textured parent material of this type is less thoroughly leached, is generally high in bases, and contains clay dominated by montmorillonite. Stratification, typical of alluvial sediments, is a common feature.

Recent Red River alluvium consists primarily of water-laid sediments derived from the Reddish Prairie soils of western and central Oklahoma and northwestern Texas. Along the eastern side of the flood plain in Bossier Parish, the parent material has been influenced locally by sediments derived from Coastal Plain soils and deposited by tributary streams. Typically, the alluvium from the Red River is reddish brown in color and alkaline or calcareous in reaction.

Within Bossier Parish, wide ranges in the texture of the alluvium have been caused by differences in deposition. All of the alluvium has been laid down by river water, either when quiet or in flood. Before manmade levees were built, the river overflowed its channels during flood stage, and water spread out over the flood plain. The coarser sediments carried in suspension were dropped in bands parallel to and near the channel. These low ridges, consisting of fine sand and silt, are known as natural levees. When the flood receded and left water standing in the lowlands, the finest sediments, or clays, settled out. These slack-water clays do not settle until the water is still.

The simple pattern of coarser sediments near the channel and fine sediments in the slack-water lowlands is common along the river, as well as near old abandoned river courses in the flood plain. Over the centuries the Red River has meandered back and forth across much of the flood plain. Many old abandoned cutoffs and ox-bow lakes are left as evidence of former courses. Sometimes natural levees laid down earlier have been cut out, sometimes sandy sediments have been deposited on top of slack-water clays. Thus, the normal pattern of sediment distribution from a single channel has been partly or completely destroyed in many places, and beds of alluvium of widely contrasting textures may be superimposed. Since construction of the manmade levee system that parallels the present channel, the flooded area has been greatly restricted.

Textural differences in the alluvium are accompanied by some differences in chemical and mineralogical composition. However, all of the alluvium is high in bases, primary minerals, and carbonates.

In small areas along minor streams in the Coastal Plain, the parent material was alluvium derived largely from Coastal Plain deposits. These sediments vary in texture, but their chemical and mineralogical properties reflect their origin. They are predominantly acid and fairly low in bases, primary minerals, and carbonates.

Living organisms

Micro-organisms are very important in soil development. Bacteria, fungi, and other micro-organisms aid in weathering and decomposing organic matter. Vegetation furnishes organic matter, aids in the transfer of elements from the subsoil to the surface soil, and alters the soil microclimate.

The kinds and numbers of plants and animals that live on and in the soil are largely determined by the climate, but they may also be influenced by relief, parent material, and the age of the soil.

Little is known about the micro-organisms in the soils of this parish, except that they live mostly in the uppermost few inches. The activity of earthworms is important in mixing of soil and decomposition of organic matter. Mixing of soil materials by rodents is slow but has influenced the development of some soils. In wet soils, crayfish bring underlying material to the surface, and their abandoned burrows are often filled with material from upper soil horizons.

Before the settlement of the parish, the native vegetation was most important in the complex of living organisms that affect soil development. Except on the bottom lands and poorly drained flatwoods, the principal native vegetation was a mixture of shortleaf pine, loblolly pine, upland oak, and hickory. On the bottom lands the trees were chiefly oak, pecan, ash, sweetgum, elm, and hackberry on the better drained soils and cypress and water-tolerant oak on the poorly drained soils. Cottonwood and willow grew on coarse-textured soils that were frequently flooded. Canebrakes covered large areas on the bottom lands and on the more fertile uplands and terraces. A few small areas consisting chiefly of the alkaline terrace soils had a sparse growth of trees. These areas were locally called "prairies." They were covered with native tall grasses, mostly bluestem, Indiangrass, and switchgrass, and scattered clumps of post oak, elm, and various shrubs.

The different types of native vegetation were generally associated with differences in soil properties. The early settlers used native vegetation as their chief indicator of soil capability and suitability for agriculture.

Topography

Topography influences soil formation chiefly through its effects on drainage, erosion, plant cover, temperature, and time of exposure of parent materials. Its influence is modified by the other four factors of soil formation.

The range in the topography of Bossier Parish is wide. Slopes range from 0 to 30 percent. Broad areas of bottom lands and stream terraces are flat or gently sloping. Small areas in the bottom lands near drains or along stream channels are moderately sloping. Fairly large areas on stream terraces near streams or escarpments have moderate to strong slopes. On the uplands or Coastal Plain, slopes vary from gentle on divides to strong on highly dissected areas near the escarpments between the uplands and the bottom lands or stream terraces.

One of the clearest examples of the influence of topography on soil in Bossier Parish is found on steep slopes along the escarpment into Bodcau Bayou. Slopes of 16 to 30 percent are common. Soils of the Susquehanna and Cuthbert series are dominant. These soils have some characteristics of Lithosols or Regosols. They have thin, weakly expressed profiles because the topography allowed geological removal of the soil almost as fast as it formed. The Boswell and Shubuta soils, which formed from similar parent materials, are generally on less steep slopes and have moderately thick, well-expressed profiles.

The Morse and Gore series show the inter-relationship of topography, parent materials, and time. Soils of these two series are commonly associated in a characteristic pattern of Morse soils on strong slopes and Gore soils on less dissected, gently sloping drainage divides. The Morse soils are relatively young, calcareous, and highly base saturated. Their parent material was derived from lower lying, relatively unleached beds that have been exposed by dissection. The Gore soils are older, more leached, and strongly acid to a depth of 30 inches or more. Their position and topography have made them more stable, and their profiles are different in chemical properties and other characteristics.

Age of landform

The length of time required for soil development depends largely on the other factors of soil formation, of which climate and parent materials are probably the most important. Less time is generally required for a soil to form in humid, warm regions that have rank vegetation than in dry or cold regions that have scanty vegetation. Less time is necessary for a soil to form from coarse-textured parent material than from fine-textured material if other things are equal.

The age of the soils of Bossier Parish covers a wide range. The Red River bottom-land soils and the soils formed in local stream alluvium are on a surface that has been in place for only a short period of geologic time. Probably the oldest alluvial soils are only a few hundred to a few thousand years old. Even now some areas receive fresh sediments frequently. The building of manmade levees for flood protection has almost eliminated the addition of fresh sediments to most of the Red River bottom-land soils. Genetic horizons are commonly faint, and the original stratification of parent materials has been little changed by soil development.

The stream terraces are of Pleistocene age and probably range from a few thousands to many thousands of years old. The soils on the terraces, with a few exceptions, are mature or approaching maturity in profile development and horizon differentiation.

The surface on which the upland soils have developed is generally of Tertiary age and is probably several million years old. The soils are mature, except where steep slopes and fine-textured parent material have allowed geologic erosion to remove soil material too rapidly for mature profiles to develop.

Sandy mounds

Small circular and oblong mounds are common on some of the soils of Bossier Parish. These natural mounds are present over large areas in Louisiana, eastern Texas, Oklahoma, Arkansas, and Missouri, but they have never been reported east of the Mississippi River. They are often called "pimple" mounds.

Geologists and others have described these mounds and offered numerous theories of their origin (*10*). They are known to occur on Tertiary, Pleistocene, and, in a few places, recent flood-plain deposits. They are most common on sandy or silty terrace flats and on broad, gently sloping upland divides. They are rare on slopes of more than about 3 percent. The soil in the mounds is invariably somewhat coarser textured and better drained than that between the mounds. Where the soil between the mounds is poorly drained silt loam, as in Wrightsville silt loam, that in the mounds is generally moderately well drained very fine sandy loam. Where the areas between the mounds are moderately well drained, as in Prentiss very fine sandy loam, the mounds are well-drained fine sandy loam.

The top of the B horizon is at the same average elevation under the mounds as between the mounds, but it is commonly less distinct. Thus, the depth of the sandy A horizon of the mound generally equals, roughly, the height of the mound plus the depth of the A horizon in the area between the mounds.

Numerous theories have been advanced for the origin of these mounds, but the fluvial erosion theory (*10*) offers what seems to be the best explanation. It is recognized, however, that other factors, such as protection by clump vegetation and local movement by wind, may have been important in their formation. Further research and study are necessary to find a completely satisfactory explanation of the exact processes of their formation.

The Red River raft

A strong influence on the pattern of drainage and deposition was exerted by the Red River raft (*5*), a great logjam that for about 175 years choked the channel of the Red River. The cause of the logjam and the date of its origin are obscure. Early accounts and descriptions of the rate of increase at the head and of decay or natural destruction at the foot have led most observers to believe it began to form at the end of the 17th century or early in the 18th century. Systematic work to break it up began in April 1833, and it was not completely removed until 1873.

In 1833, the raft extended in an intermittent pattern from about the southern boundary of Bossier Parish to about 20 miles north of Shreveport. Later it re-formed farther north. At one time or other, it extended from near the Arkansas line to below Campti, Louisiana, a distance of more than 160 miles. All of the river bordering Bossier Parish was affected.

While the main channel of the river was blocked, natural levees formed along the outlet bayous. Old natural levees were flooded. The damming of tributaries formed large lakes, which were destroyed by the removal of the raft. All of this influenced the pattern and nature of the alluvial sediments in which the bottom-land soils formed.

Many lakes shown on maps drawn before 1840 no longer exist. When the raft was removed and the outlet bayous were closed by plugs and manmade levees, the river was forced to begin cutting and enlarging its main channel. This process lowered the base level of the streambed and eventually resulted in the partial draining of many of the raft-formed lakes, including Posten, Phelps, and Bodcau Lakes in Bossier Parish. Agricultural drainage has completed this process. Little remains of these extensive lakes, which once furnished steamboat routes around logjams in the river channel.

Among the soils that are believed to have been affected by the changes in the pattern of drainage and deposition are Gallion clay, overwash; Yahola clay, overwash; and soils of the Buxin series. Gallion clay, overwash, and Yahola clay, overwash, have been mapped where parts of natural levees that predated the raft were covered with thin layers of fine-textured material. The Buxin soils consist of reddish, clayey sediments deposited over a dark-gray layer that had developed in a swamp or intermittent lake.

Deposition of alluvium has been minor and localized since the outlets were closed by levees constructed after the removal of the raft.

Classification of Soils in Bossier Parish

Soils are placed in narrow classes for the organization and application of knowledge about their behavior on a single farm or within a parish. They are placed in broad classes for study and comparison of continents and other large areas. In the comprehensive system of soil classification followed in the United States, the soils are placed in six categories. Beginning with the most inclusive, the six categories are the order, suborder, great soil group, family, series, and type.

There are three orders and thousands of types. The suborder and family categories have never been fully developed and thus have been little used. Attention has been given largely to the classification of soils into soil types and series within parishes or comparable areas and to the subsequent grouping of series into great soil groups and orders (table 10).

Each great soil group in the zonal order consists of soils that have common internal characteristics that developed through the influence of environmental forces of broad geographic significance, especially vegetation and climate (*16*). In Bossier Parish, the great soil groups in this order are the Red-Yellow Podzolic, the Reddish-Brown Lateritic, and the Gray-Brown Podzolic soils.

Each great soil group in the intrazonal order consists of soils that have common internal characteristics developed through the influence of environmental forces of both

TABLE 10.—*Classification of soil series in Bossier Parish, and soil-forming factors*

Great soil group and series	Parent material	Topographic position	Drainage class	Slope range	Degree of profile development [1]
Red-Yellow Podzolic soils that are representative of the group:				*Percent*	
Boswell	Coastal Plain acid clay	Upland	Moderately well drained.	1 to 20	Strong.
Bowie	Coastal Plain stratified sandy loam and sandy clay loam.	Upland	Moderately well drained.	1 to 5	Strong.
Cahaba	Old, moderately coarse textured to medium textured alluvium from the Coastal Plain or red beds.	Stream terrace	Well drained	1 to 8	Moderate.
Hortman	Old, clayey alluvium, principally from red-bed sediments.	Stream terrace	Moderately well drained.	1 to 20	Moderate.
Kalmia	Old, moderately coarse textured to medium textured alluvium from Coastal Plain.	Stream terrace	Moderately well drained.	1 to 5	Moderate.
Luverne	Stratified Coastal Plain sandy loam and clay loam.	Upland	Well drained	1 to 20	Strong.
McKamie	Stratified, old alluvium, principally from red beds.	Stream terrace	Well drained	1 to 20	Moderate.
Muskogee	Old, clayey alluvium, principally from red beds.	Stream terrace	Moderately well drained.	1 to 8	Moderate.
Ruston	Coastal Plain sandy loam	Upland	Well drained	1 to 20	Strong.
Shubuta	Thinly stratified Coastal Plain clay, sandy clay, silt, and fine sand.	Upland	Moderately well drained to well drained.	1 to 30	Strong.
Vaucluse	Coastal Plain sandy clay and sandy clay loam.	Upland	Moderately well drained.	1 to 16	Strong.
Red-Yellow Podzolic soils that have some characteristics of Reddish-Brown Lateritic soils:					
Amite	Old, moderately coarse textured to medium textured alluvium, principally from red beds.	Stream terrace	Well drained	1 to 20	Strong.
Kirvin	Coastal Plain sandy clay and sandy clay loam, high in iron oxides.	Upland	Well drained	1 to 30	Strong.
Orangeburg	Coastal Plain sandy loam and loamy sand.	Upland	Well drained	1 to 20	Strong.

See footnote at end of table.

TABLE 10.—*Classification of soil series in Bossier Parish, and soil-forming factors*—Continued

Great soil group and series	Parent material	Topographic position	Drainage class	Slope range	Degree of profile development [1]
Red-Yellow Podzolic soils that have some characteristics of Low-Humic Gley soils:				*Percent*	
Gore	Old, clayey alluvium, principally from red beds.	Stream terrace	Somewhat poorly drained to moderately well drained.	1 to 20	Weak.
Sawyer	Coastal Plain clay and silty clay	Upland	Moderately well drained.	1 to 5	Strong.
Red-Yellow Podzolic soils that have some characteristics of Planosols (fragipan):					
Prentiss	Old, medium-textured to fine-textured alluvium from Coastal Plain or red beds.	Stream terrace	Moderately well drained.	0 to 5	Strong.
Savannah	Stratified Coastal Plain sandy loam and sandy clay loam.	Upland	Moderately well drained.	1 to 5	Strong.
Tilden	Old, moderately coarse textured to moderately fine textured alluvium from the Coastal Plain or red beds.	Stream terrace	Moderately well drained.	0 to 8	Strong.
Red-Yellow Podzolic soils that have some characteristics of Regosols:					
Cuthbert	Thinly stratified Coastal Plain clay, sandy clay, and clay shale.	Upland	Moderately well drained.	8 to 30	
Susquehanna	Coastal Plain acid clay	Upland	Moderately well drained.	1 to 30	Weak.
Reddish-Brown Lateritic soils:					
Nacogdoches	Coastal Plain clay loam, high in iron oxides, with glauconitic sand in places.	Upland	Well drained	1 to 30	Strong.
Gray-Brown Podzolic soils that have some characteristics of Alluvial soils:					
Gallion	Young alluvium from red beds, Coastal Plain, and other sources.	High bottom or low terraces.	Moderately well drained to well drained.	0 to 5	Weak.
Low-Humic Gley soils:					
Bibb	Young, acid, medium-textured alluvium, principally from Coastal Plain.	Flood plain of local streams.	Poorly drained	0 to 1	Very weak.
Chastain	Young, acid, clayey alluvium, principally from Coastal Plain.	Flood plain of local streams.	Very poorly drained	0 to 1	Very weak.
Myatt	Old alluvium, principally from Coastal Plain.	Stream terrace	Poorly drained	0 to 1	Weak.
Planosols (claypan):					
Acadia	Old, clayey alluvium, principally from red beds.	Stream terrace	Somewhat poorly drained.	0 to 3	Strong.
Wrightsville	Old, clayey alluvium, principally from red beds.	Stream terrace	Poorly drained	0 to 1	Strong.
Planosols (fragipan):					
Stough	Old, medium-textured to fine-textured alluvium from Coastal Plain.	Stream terrace	Somewhat poorly drained.	0 to 3	Strong.
Pheba	Stratified Coastal Plain silt loam and silty clay loam.	Upland	Somewhat poorly drained.	0 to 3	Strong.

See footnote at end of table.

TABLE 10.—*Classification of soil series in Bossier Parish, and soil-forming factors*—Continued

Great soil group and series	Parent material	Topographic position	Drainage class	Slope range	Degree of profile development[1]
Regosols that are representative of the group:				*Percent*	
Lakeland	Coastal Plain sand and loamy sand.	Upland	Excessively drained	1 to 20	Weak.
Huckabee	Old, coarse-textured alluvium, principally from red beds.	Stream terrace	Excessively drained	1 to 20	Weak.
Regosols that have some characteristics of Red-Yellow Podzolic soils:					
Eustis	Coastal Plain loamy sand	Upland	Excessively drained	1 to 20	Weak.
Independence	Old, coarse-textured alluvium from Coastal Plain.	Stream terrace	Somewhat excessively drained.	0 to 1	Weak.
Grumusols that have some characteristics of Low-Humic Gley soils:					
Perry	Young, clayey alluvium, chiefly from red beds and Coastal Plain.	Flood plain of the Red River and its tributaries.	Poorly drained	0 to 1	Very weak to weak.
Grumusols that have some characteristics of Alluvial soils:					
Morse	Old, calcareous, clayey alluvium, principally from red beds.	Stream terrace	Well drained	1 to 20	Weak.
Alluvial soils that are representative of the group:					
Hannahatchee	Young, acid, moderately coarse textured to medium textured alluvium, principally from Coastal Plain.	Flood plain of local streams.	Moderately well drained to well drained.	1 to 5	Very weak.
Iuka	Young, acid, moderately coarse textured to medium textured alluvium, principally from Coastal Plain.	Flood plain of local streams.	Moderately well drained.	0 to 3	Very weak.
Ochlockonee	Young, acid, moderately coarse textured to medium textured alluvium, principally from Coastal Plain.	Flood plain of local streams.	Well drained	0 to 3	Very weak.
Yahola	Young, alkaline and calcareous, medium-textured alluvium, principally from red beds.	Flood plain of the Red River	Well drained	0 to 8	Very weak.
Alluvial soils that have some characteristics of Grumusols:					
Buxin	Young, neutral and calcareous, clayey alluvium, principally from red beds.	Flood plain of the Red River.	Somewhat poorly drained.	0 to 3	Very weak.
Miller	Young, alkaline and calcareous, clayey alluvium, principally from red beds.	Flood plain of the Red River.	Moderately well drained to somewhat poorly drained.	0 to 8	Very weak.
Roebuck	Young, neutral and calcareous, clayey alluvium, principally from red beds.	Flood plain of the Red River.	Somewhat poorly drained to moderately well drained.	0 to 3	Very weak.
Alluvial soils that have some characteristics of Low-Humic Gley soils:					
Mantachie	Young, acid, medium-textured alluvium, principally from Coastal Plain.	Flood plain of local streams.	Somewhat poorly drained.	0 to 1	Very weak.

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[1] As indicated by the number of important genetic horizons and the degree of contrast between them.

broad and local significance. In Bossier Parish the great soil groups in this order are the Low-Humic Gley soils, the Grumusols, and the Planosols.

In the azonal order, each great soil group consists of soils, few or none of whose characteristics are developed, but which have common characteristics as a result of the influence of some local condition of parent material or relief. In Bossier Parish, the great soil groups in this order are the Alluvial soils and the Regosols.

Red-Yellow Podzolic soils

This great soil group consists of well-developed, well drained or moderately well drained, acid soils formed under forest vegetation in climates ranging from warm-temperate humid to tropical humid. These soils have thin organic A_0 and organic-mineral A_1 horizons, over a light-colored, bleached A_2 horizon, over a red, yellowish-red, or yellow and more clayey B_2 horizon. Coarse reticulate streaks or mottles of red, yellow, brown, and light gray are generally characteristic of the deep horizons.

In general, the soils of this group have low cation exchange capacity and low base saturation. In Bossier Parish many of the soils customarily placed in the Red-Yellow Podzolic group vary considerably from the central concept of this group in several respects. The cation exchange capacity and base saturation are, in many places, somewhat higher than those reported for the same series as mapped in States farther east. This is probably due to the parent materials and types of clay minerals. Many of the Red-Yellow Podzolic soils in Bossier Parish, even those that formed from very siliceous parent material, have clay fractions higher in montmorillonite and other expanding type clays than similar soils of the South Atlantic States.

In general, the percentage of base saturation decreases with depth in the profiles of Red-Yellow Podzolic soils. However, in Bossier Parish, a few of the soils placed in this group have base exchange capacities that remain about the same or increase slightly with depth.

All the Red-Yellow Podzolic soils in Bossier Parish, when undisturbed, have a dark-colored but thin A_1 horizon, in which the organic-matter content is higher than that in the horizons below. This is underlain by an evident A_2 horizon of lighter color and generally weaker granular or crumb structure. These soils, in most places, are medium to strongly acid in the A_2 horizon. Most of them have moderate to strong, subangular blocky structure in the B_2 horizon, which contains more clay than the A_2. The B_2 horizon generally is strongly to very strongly acid. The C horizon is faintly to prominently mottled or splotched with red, yellow, brown, and gray. The structure is less strong in the C horizon, and the amount of gray mottling commonly increases with depth.

The Luverne soils are good examples of well-drained Red-Yellow Podzolic soils. They have a thick, red to dark-red subsoil that has moderate, medium, subangular blocky structure. The moist color of the B_2 and B_3 horizons commonly is on the 2.5YR hue with values of 3 and 4. When the soil is dry, however, it is lighter; the color value is 2 or more units higher.

The Shubuta and Boswell soils are moderately well drained. They are finer textured in the B and C horizons than the Luverne soils. They also are much shallower over mottled material. The B horizon of the Shubuta soils is red, heavy sandy clay that has strong to moderate, subangular blocky structure. Mottling is at a depth of about 18 inches. The C horizon consists of thinly stratified red sandy clay, light-gray clay, and red very fine sand. The B horizon of the Boswell soils is red to dark-red clay that has moderate, fine, angular blocky structure. Mottling is at a depth of about 17 inches. The C horizon is gray clay prominently mottled with dark red.

The Ruston and Bowie soils have a coarser textured and less reddish B horizon than the Luverne soils. The color of the B_2 of the Ruston is within the range of 7.5YR and 5YR hues; that of the Bowie soil is in the 10YR hue with chroma of 6 or higher. The Luverne soils have a hue of 2.5YR. The Ruston and Bowie soils commonly are prominently mottled at much shallower depths.

The Cahaba and Kalmia soils are distinguished from the Luverne series by less reddish hues, a more weakly developed B_2 horizon, and less evidence of clay movement. They also are developed on younger, less dissected surfaces. They differ from each other principally in color. The B horizon of the Cahaba soils is in the range of the 7.5YR and 5YR hues, while that of the Kalmia soils is a 10YR hue and is mottled at a lesser depth than that of the Cahaba soils, which are seldom mottled within the solum.

The Vaucluse soils differ from the Luverne soils in having a thin, prominently mottled, firm sandy clay subsoil, while the corresponding horizons of the Luverne soils are thick, unmottled, and friable.

The McKamie, Muskogee, and Hortman soils are representative of the Red-Yellow Podzolic soils in number, kind, and color of horizons. They have, however, a moderate degree of base saturation that increases with depth. This is an indication of the progress or intensity of weathering. Typically, the base saturation of Red-Yellow Podzolic soils is low to moderately low and decreases with depth. The McKamie soils are well drained and have a red clay B horizon that is free of mottles. The Muskogee soils are moderately well drained and have a reddish-yellow silty clay B_2 horizon that has distinct mottles at a depth of about 16 inches. The Hortman soils are moderately well drained and have a red clay B_2 horizon that is mottled at a depth of about 16 inches. The C horizon is dark red to red clay prominently mottled with gray.

Red-Yellow Podzolic soils that have some characteristics of Reddish-Brown Lateritic soils.—Although the Amite, Kirvin, and Orangeburg soils are in the Red-Yellow Podzolic great soil group, they have some of the characteristics of Reddish-Brown Lateritic soils. The subsoil is dark red (2.5YR 3/6 to 3/8) when moist, like that of Reddish-Brown Lateritic soils. The lack of a well-defined A_2 horizon also indicates that these soils are grading toward Reddish-Brown Lateritic soils.

The Orangeburg soils have a coarser textured subsoil than the Luverne soils. The Amite soils are similar in many ways to the Orangeburg soils, but they have more silt and very fine sand throughout the profile, a slightly finer textured B horizon, and probably a higher cation exchange capacity and higher base saturation. The Kirvin soils have a darker brown A_1 horizon and a more granular structure than the Luverne soils, and they contain more ironstone plates and fragments, particularly in the C horizon and the lower part of the B horizon. They have a weakly developed A_2 horizon. In general, the B_2 horizon is less friable and less permeable than that of the Nacogdoches soils, which are typical Reddish-Brown Lateritic soils. The A_1 horizon commonly is dark brown, whereas the Nacogdoches soils have a dark reddish-brown A_1 horizon.

Red-Yellow Podzolic soils that have some characteristics of Low-Humic Gley soils.—The Gore and Sawyer series consist of Red-Yellow Podzolic soils that have some characteristics of Low-Humic Gley soils. In contrast to the Luverne soils, the Sawyer soils become progressively finer textured with depth, and the C horizon is gray and red, mottled, plastic silty clay or clay. They have a yellower B horizon and are prominently mottled at a depth of about 24 inches. They are moderately well drained.

The Gore soils are somewhat poorly drained to moderately well drained, have a thin solum, and they have a thin and not very distinct B horizon. They have developed in plastic, sticky clay on both gentle and strong slopes.

Red-Yellow Podzolic soils that have some characteristics of Planosols (fragipan).—The Prentiss, Savannah, and Tilden series consist of moderately well drained Red-Yellow Podzolic soils that have some characteristics of Planosols. They have a fragipan layer, the top of which is 22 to 33 inches below the surface. The fragipan, however, is less distinct and commonly is at a greater depth than that of the Pheba and Stough soils.

Red-Yellow Podzolic soils that have some characteristics of Regosols.—Regosols are an azonal group of soils that consist of deep, unconsolidated rock (soft mineral deposits) in which few or no clearly expressed soil characteristics have developed (*12*). Both the Susquehanna and Cuthbert series have a thin solum and have a thin, weakly expressed B horizon. They are, therefore, considered as grading toward Regosols. The Susquehanna soils developed in plastic, sticky clays, but the parent material of the Cuthbert is thinly stratified clay, sandy clay, sandy loam, and clay shale. The Susquehanna and Cuthbert soils are typically on strong slopes.

Reddish-Brown Lateritic soils

This great soil group consists of well-drained, acid soils formed under forest vegetation in climates that range from warm-temperate humid to tropical humid. These soils have a dark reddish-brown, granular surface layer, a red or dark-red, friable, clayey B_2 horizon, and red or reticulately mottled lateritic parent material. They lack the distinct, lighter colored A_2 horizon characteristic of the Red-Yellow Podzolic soils. They commonly have a darker red B horizon.

The Nacogdoches soils are fairly typical members of this great soil group. They have a dark reddish-brown A_1 horizon that has moderate granular structure. The B_2 horizon colors range through 2.5YR and 10R hues, and chromas range from 4 to 6. The B horizon is friable or very friable, and the solum is thick, generally between 60 and 120 inches in depth. Sand grains coated with iron oxide are common, and also rounded to angular ironstone fragments. The parent material was derived from the Cook Mountain formation, which was high in iron oxides and contained glauconitic sand in many places.

Gray-Brown Podzolic soils

These soils, when undisturbed, have a thin, dark-colored surface layer, a leached, grayish-brown subsurface horizon, and a brown or yellowish-brown subsoil in which clay has accumulated. They are moderately leached, and base saturation remains the same or increases with depth.

None of the soils in Bossier Parish are typical Gray-Brown Podzolic soils. However, the Gallion soils have many of the important charcteristics of this group.

Gray-Brown Podzolic soils that have some characteristics of Alluvial soils.—The soils of the Gallion series are minimal Gray-Brown Podzolic soils that have some characteristics of Alluvial soils. As mapped in Bossier Parish, many of the Gallion soils have a 4- to 6-inch surface layer of more recently deposited, finer textured alluvium. These soils are mapped as overwash phases. Typically, Gallion soils have a weakly to moderately well expressed B horizon that has a few thin clay films, mostly on vertical structural faces. The reaction of the A and B horizons commonly ranges from moderately acid to slightly acid. A neutral to mildly alkaline C horizon is typical. Stratification is common. Most of the parent material is sandy loam, silt loam, or silty clay loam, but in a few places layers of silty clay may be present. Base saturation is commonly more than 50 percent in the A and B horizons and normally increases with depth.

The Gallion soils are like Alluvial soils chiefly in that their horizons are more nearly faint than distinct, they have recent alluvial deposits on the surface, and there is evidence of the original stratification within the profile. The effect of time has evidently been important in determining the present nature of these soils.

Low-Humic Gley soils

Low-Humic Gley soils are poorly drained and somewhat poorly drained. They have a thin surface horizon that is moderately high in organic matter. They have strongly gleyed B and C horizons that show little difference in texture caused by soil-forming processes.

In Bossier Parish, the Bibb, Chastain, and Myatt soils are in the Low-Humic Gley great soil group. The Myatt soils are typical of this group. They have a dark-gray A_1 horizon, generally 1 to 2 inches thick, underlain by strongly gleyed, predominantly gray A_2, B, and C horizons that show little difference in texture. In places, layers that contrast strongly in texture are present, but these are caused by original stratification of the alluvial parent materials instead of soil-forming processes.

The Bibb soils are poorly drained, predominantly gray, and subject to frequent flooding. Gleying appears to have dominated the other processes of soil formation.

The Chastain soils are very poorly drained. They have a gray clay surface layer over strongly gleyed, gray, clayey material.

Planosols

Planosols are intrazonal soils that have an eluviated surface horizon underlain by a claypan or fragipan. These soils developed on nearly flat or gently sloping topography in humid or subhumid climates.

In Bossier Parish, the Acadia and Wrightsville soils are Planosols of the claypan type. The Stough and Pheba soils are of the fragipan type.

Planosols (claypan).—The Acadia soils are somewhat poorly drained. They show the effects of a high or fluctuating water table and flat or nearly flat relief. They have a thin, dark-colored A_1 horizon, a lighter colored A_2 horizon that has a clear lower boundary, and a silty clay or clay B horizon. The lower part of the B horizon and the C horizon are moderately to strongly gleyed. The boundary between the A_2 and B horizons is not so abrupt as that considered typical for Planosols, but other characteristics, such as the massive to weak, coarse, prismatic structure of the C horizon, are characteristic of the Planosol group.

The Wrightsville soils are poorly drained. They have a dark-gray, thin A_1 horizon and a moderately gleyed, gray or light-gray A_2 horizon, which in most places rests abruptly on massive to weakly prismatic silty clay. The base saturation is medium to high and increases with depth. The clay is dominantly montmorillonite.

A small acreage of Wrightsville silty clay seems to have characteristics of both the Low-Humic Gley and Grumusol groups.

Planosols (fragipan).—The Pheba and the Stough soils have many characteristics in common. They are fairly typical of somewhat poorly drained Planosols of the fragipan type. The top of the fragipan in most places is between 16 and 26 inches below the surface. The clay substratum that is present in many of the Stough soils is evidently an unconformable layer, not directly related to the horizons above.

Regosols

Regosols are azonal soils that consist of unconsolidated, soft mineral deposits in which few or no clearly expressed soil characteristics have developed.

The Lakeland and Huckabee soils are in this great soil group. They are deep, very sandy soils that show little change in texture to a depth of several feet. The colors of all horizons except the A_1 are rather weak, ranging from light gray through pale brown to reddish yellow. The textures commonly are loamy fine sand and fine sand. The Huckabee soils differ from the Lakeland soils chiefly in having somewhat darker A_1 horizons and in having more stratified, generally stronger colored underlying layers. They formed on stream terraces in old, strongly leached alluvium.

Regosols that have some characteristics of Red-Yellow Podzolic soils.—The Eustis and Independence soils are placed in the Regosol group, but they have several characteristics of Red-Yellow Podzolic soils. They have strong colors that range from 7.5YR to 5YR in hue. They commonly have a well-developed color B horizon and in some places a very weakly developed textural B horizon. The Independence soils differ from the Eustis soils principally in thickness and color of the A horizon. The A horizon of the Eustis soils is 20 to 30 inches thick and dark gray to dark grayish brown. The A horizon of the Independence soils is about 12 inches thick and dark brown in color. The Independence soils formed on stream terraces in old, strongly leached alluvium.

Grumusols

This great soil group contains fine-textured (generally clay) soils in which the clay minerals are dominantly montmorillonitic. They may have a prominent A_1 horizon, but they lack a B horizon. The soils expand and shrink greatly when their moisture content changes. This causes a churning or mixing of horizons and accounts for the youthful appearance of the profiles. Hogwallow or gilgai microrelief is characteristic of flat or gently sloping areas of these soils.

Grumusols that have some characteristics of Low-Humic Gley soils.—The Perry soils show the effects of churning through shrinking, swelling, and cracking. They are, therefore, tentatively classified as Grumusols. When the soils shrink and swell, they crack, and material from upper horizons drops down into lower ones. This churns or mixes the soils continually and partly offsets horizon differentiation.

The Perry soils have some characteristics of Low-Humic Gley soils. Gleying has been one of the dominant processes of soil development. These soils also seem more poorly drained than is typical of Grumusols, but they are not too wet for churning and mixing to take place.

The Perry soils have a dark-gray clayey A horizon over a mottled or splotched, light-gray, gray, and dark-gray horizon. They have a brown or yellowish-brown and reddish-brown, acid clay C horizon several feet thick, which grades into reddish-brown, alkaline or calcareous clay. The Perry soils are poorly drained. Large areas are subject to flooding by backwater.

Grumusols that have some characteristics of Alluvial soils.—The Morse soils are on flat areas or gentle slopes. They crack, swell, and shrink. They have redder AC and C horizons than the Miller soils (which are classified as Alluvial soils that have some characteristics of Grumusols), and they lack a B horizon. The exchange capacity is high, and base saturation is very high, commonly approaching 100 percent. The A_1 horizon ranges from dark reddish brown to very dark grayish brown. The C horizon is commonly reddish brown or red.

Alluvial soils

This group consists of soils that have developed in transported and fairly recently deposited alluvial material. The original material has been modified little or not at all by soil-forming processes.

The Iuka and Ochlockonee soils formed in alluvium derived principally from Red-Yellow Podzolic soils. Their chemical and mineralogical properties are, therefore, similar to those of Red-yellow Podzolic soils. These soils are acid and generally low in primary minerals. They have a low to medium cation exchange capacity and a low base saturation.

The Iuka soils are moderately well drained and mostly brown or yellowish brown, with gray mottling at a depth of about 20 inches. The Ochlockonee soils are well drained and brown or yellowish brown to a depth of 30 inches or more.

The Hannahatchee soils formed in alluvium derived principally from Reddish-Brown Lateritic soils. The colors are strong brown to dark red. Most other characteristics are similar to those of the Ochlockonee soils.

The Yahola soils formed in sediments derived principally from red beds and deposited by floodwaters of the Red River. The Yahola soils are mildly to moderately alkaline and are high in base saturation and in primary minerals. Their clays are dominantly montmorillonitic. Colors are dominantly reddish brown. Thin stratification is common. The textures are mostly silty clay loam, silt loam, or very fine sandy loam. In a few places there are thin strata of silty clay or clay. These soils are generally protected by levees and are seldom flooded.

Alluvial soils that have some characteristics of Grumusols.—Soils of the Buxin, Roebuck, and Miller series are Alluvial soils, but they have several characteristics of Grumusols. Miller clay, for example, swells and shrinks greatly when its moisture content changes, its clays are dominantly montmorillonite, and it shows evidence of considerable mixing, particularly to a depth of about 20 inches. In undisturbed areas, faint to distinct gilgai microrelief is common. The Miller soils are reddish brown to dark reddish brown. They have no genetic horizons other than a strong granular A horizon slightly darkened by organic matter. The structure is usually strong granular to angular blocky.

The Roebuck soils are similar to the Miller soils, but they are less red and generally less alkaline, and they have some dark-gray splotches and spots at a depth of more than 20 inches.

The Buxin soils are a result of two different sets of soil-forming processses. The upper part of the profile, to a depth of 14 to 24 inches, is much like that of the Miller and Roebuck soils. Typically, it consists of a 4- to 10-inch A_p horizon of dark reddish-brown (5YR 3/3 to 3/4 when moist) clay to silty clay loam, over a 6- to 20-inch C horizon of dark reddish-brown to reddish-brown (5YR 3/4 to 4/4 when moist), very plastic clay. This rests abruptly on a lower sequence of horizons. First there is a 6- to 15-inch layer of dark-gray (N 4/0 to 10YR 4/1 when moist) clay to silty clay loam that has spots of dark reddish brown and in many places contains small pieces of carbonized wood. This appears to be a buried A horizon. Next is a variegated horizon of dark-gray (10YR 4/1 when moist), dark-brown (10YR 4/4 when moist), and dark reddish-brown or reddish-brown (5YR 3/4 when moist) clay. This horizon is from 12 inches to several feet thick and is underlain by red (10R 4/6), calcareous, plastic clay.

This lower or buried sequence probably formed in a seasonally wet environment from material that included rather large amounts of organic matter. Many of the larger areas of Buxin soils occupy old lakebeds. The lakes have been drained since the beginning of cultivation of the Red River bottom lands. Phelps and Posten Lakes are good examples of the environment under which Buxin soils have developed.

Alluvial soils that have some characteristics of Low-Humic Gley soils.—The soils of the Mantachie series are Alluvial soils that are grading toward Low-Humic Gley soils. They formed from alluvium deposited on the flood plains. They are somewhat poorly drained and have a mottled, gray and brown, moderately gleyed C horizon.

Laboratory Studies

Mechanical and Chemical Analyses

Six soil types, representing five series, were sampled and analyzed to determine characteristics of the series (tables 11 and 12). The soils were selected on the basis of their acreage and importance in the parish, the scarcity of published data on their characteristics, and the need for chemical and mineralogical data to use in classifying the soils at or above the series level. The Buxin, Ruston, and Tilden samples and the Wrightsville silty clay samples were analyzed by the SCS Soil Survey Laboratory in Lincoln, Nebraska. The Cahaba samples and the Wrightsville silt loam samples were analyzed by the SCS Soil Survey Laboratory in Beltsville, Maryland. The nitrogen content and pH of the Wrightsville silt loam samples were determined by Dr. B. N. Driskell of the Louisiana State University. The nitrogen content was determined by the micro-Kjeldahl procedure.

Clay Mineralogy

Clay analyses were made of certain horizons from representative profiles of Tilden very fine sandy loam, Wrightsville silty clay, and Wrightsville silt loam. Except for Wrightsville silt loam, these samples are not the same as those selected for the analyses reported in tables 11 and 12. Therefore, the designations and depths of horizons are different. Both sets of samples are well within the central concept of each of the respective soil series. The samples were analyzed by the Soil Survey Laboratory of the Soil Conservation Service, at Beltsville, Maryland. An X-ray spectrometer, equipped with a Geiger counter and a chart recorder, was used.

Tilden very fine sandy loam

A_3	7 to 9 inches; montmorillonite is dominant; amount of illite is moderate; amount of kaolinite is small; no gibbsite is present.
B_3	20 to 27 inches; montmorillonite is dominant; amount of illite is moderate; amount of kaolimate increases to about 10 percent.
A_{3b}	31 to 38 inches; amounts are about the same as in horizon above, but contents of illite and kaolinite are slightly higher.
B_{2b}	45 to 69 inches; horizon differs from the horizons above; dominant minerals are mixed layer of montmorillonite-vermiculite and illite; somewhat more kaolinite is present than in horizons above; 10 percent gibbsite is present.

Wrightsville silty clay

A_2	2 to 9 inches; montmorillonite is dominant; illite and some kaolinite are present.
B_1	9 to 18 inches; montmorillonite is dominant; illite and some kaolinite are present; about 15 percent is gibbsite.
B_{21}	18 to 32 inches; montmorillonite is dominant; less illite is present than in horizon above; content of kaolinite is about the same; content of gibbsite is less than in horizon above.
B_{22}	32 to 47 inches; montmorillonite is dominant; content of illite increases slightly; content of kaolinite is about the same; content of gibbsite increases slightly.
A_b	47 to 60 inches; montmorillonite is dominant; content of illite is greater than in horizon above; content of kaolinite is the same; content of gibbsite is much less.

Wrightsville silt loam

A_{22} and A_3	2 to 11 inches; montmorillonite is dominant but not well crystallized; small amounts of illite and kaolinite are present.
B_2	11 to 23 inches; somewhat poorly crystallized montmorillonite is dominant; slightly more kaolinite is present than in horizon above.
A_{2b}	23 to 28 inches; somewhat poorly crystallized montmorillonite is dominant; amounts of illite and kaolinite are slightly less than in horizon above.
B_{21b}	28 to 40 inches; montmorillonite is dominant but is better crystallized than in horizon above; amounts of illite and kaolinite are about the same as or slightly less than in horizon above.
B_{22b}	40 to 55 inches; montmorillonite is dominant and fairly well crystallized; amounts of illite and kaolinite are about the same as or slightly less than in horizon above.
	55 to 65 inches; montmorillonite is dominant; possibly somewhat more illite is present than in horizon above; amount of kaolinite is about the same.
	65 to 90 inches; about the same kinds and amounts of minerals are present as in horizon above, with a possible slight further increase in content of illite.

No gibbsite is present in this profile.

TABLE 11.—*Mechanical analyses of selected soils*

[Dashed lines indicate that the determination was not made or that the amount determined was below the minimum reportable value]

Soil type and sample number	Depth	Horizon	Particle size distribution							Textural class
			Very coarse sand (2.0 to 1.0) mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	
Buxin clay:	*Inches*		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	
S57La-8-7-(1)	0 to 5	A_{11}	--------	--------	--------	0.1	0.7	24.8	74.4	Clay.
S57La-8-7-(2)	5 to 9	A_{12}	--------	--------	0.1	.9	2.7	33.6	62.7	Clay.
S57La-8-7-(3)	9 to 21	AC	--------	0.3	.3	2.0	5.8	41.5	50.1	Silty clay.
S57La-8-7-(4)	21 to 34	C_{11}	--------	.1	.1	2.1	7.7	41.7	48.3	Silty clay.
S57La-8-7-(5)	34 to 46	C_{12}	--------	.1	.1	5.5	14.2	43.9	36.2	Silty clay loam or clay loam.
S57La-8-7-(6)	46 to 50+	C_2	--------	.1	.1	9.5	21.8	37.6	30.9	Clay loam.
Cahaba fine sandy loam:										
S55La-8-2-(1)	0 to 5	A_p	--------	.1	.6	46.3	29.4	20.6	3.0	Loamy fine sand.
S55La-8-2-(2)	5 to 9	B_a	--------	--------	.6	41.3	25.0	24.7	8.4	Fine sandy loam.
S55La-8-2-(3)	9 to 16	B_1	--------	.1	.6	38.6	24.0	24.0	12.7	Fine sandy loam.
S55La-8-2-(4)	16 to 29	B_2	--------	.1	.6	37.4	23.6	23.0	15.3	Fine sandy loam.
S55La-8-2-(5)	29 to 42	B_3	--------	.2	.6	39.0	24.3	22.5	13.4	Fine sandy loam.
S55La-8-2-(6)	42 to 52+	C	--------	.1	.6	42.6	26.0	18.7	12.0	Fine sandy loam.
Ruston fine sandy loam, hard substratum:										
S57La-8-1-(1)	0 to 6	A_p	1.7	1.8	2.6	35.2	22.7	29.3	6.7	Fine sandy loam.
S57La-8-1-(2)	6 to 10	B_1	1.5	1.2	1.9	28.0	20.8	33.6	13.0	Fine sandy loam.
S57La-8-1-(3)	10 to 18	B_{21}	1.6	.8	1.5	24.0	18.5	31.3	22.3	Loam.
S57La-8-1-(4)	18 to 24	B_{22}	3.2	3.3	1.5	19.0	16.2	29.9	26.9	Loam.
S57La-8-1-(5)	24 to 29	B_3	3.2	1.2	1.4	22.6	18.8	28.0	24.8	Loam or sandy clay loam.
S57La-8-1-(6)	29 to 36	D_1	3.4	1.5	1.6	24.7	20.0	25.8	23.0	Sandy clay loam.
S57La-8-1-(7)	36 to 46+	D_2	8.1	1.9	1.8	23.5	19.2	22.5	23.0	Sandy clay loam.
Tilden very fine sandy loam:										
S57La-8-3-(1)	0 to 5	A_p	1.0	.5	.2	12.4	45.0	36.0	4.9	Very fine sandy loam.
S57La-8-3-(2)	5 to 11	B_{21}	.8	.4	.1	7.8	30.1	41.3	19.5	Loam.
S57La-8-3-(3)	11 to 17	B_{22}	.4	.4	.1	7.2	26.7	39.5	25.7	Loam.
S57La-8-3-(4)	17 to 25	B_{23}	.7	.3	.1	5.1	28.9	38.7	26.2	Loam.
S57La-8-3-(5)	25 to 33	B_{31}	.8	.3	.1	7.7	30.7	38.3	22.1	Loam.
S57La-8-3-(6)	33 to 44	B_{32mg}	.5	.5	.2	8.9	34.0	37.9	18.0	Loam.
S57La-8-3-(7)	44 to 54+	D_g	.2	.2	.1	5.6	24.0	27.0	43.0	Clay.
Wrightsville silt loam:										
S56La-8-3-(1)	0 to 2	A_{21}	.1	.4	.5	3.6	20.6	57.7	17.1	Silt loam.
S56La-8-3-(2)	2 to 11	A_{22}, A_3.	--------	.2	.2	3.2	28.4	55.5	12.5	Silt loam.
S56La-8-3-(3)	11 to 23	B_2	.1	.5	.4	2.4	20.6	55.2	20.8	Silt loam.
S56La-8-3-(4)	23 to 28	A_{2b}	.1	.4	.2	2.0	17.1	56.5	23.7	Silt loam.
S56La-8-3-(5)	28 to 40	B_{21b}	--------	.1	.1	1.2	11.7	49.4	37.5	Silty clay loam.
S56La-8-3-(6)	40 to 55	B_{22b}	.1	.1	.1	1.0	12.3	45.5	40.9	Silty clay.
S56La-8-3-(7)	55 to 65	--------	--------	--------	--------	.8	14.7	44.0	40.5	Silty clay.
S56La-8-3-(8)	65 to 90	--------	--------	.1	.1	1.3	17.3	44.3	36.9	Silty clay loam.
Wrightsville silty clay:										
S57La-8-4-(1)	0 to 2	A_1	.5	.3	.1	2.3	9.7	49.6	37.5	Silty clay loam.
S57La-8-4-(2)	2 to 8	A_{2g}	--------	.1	.1	2.4	9.6	48.3	39.5	Silty clay loam.
S57La-8-4-(3)	8 to 15	B_{21g}	--------	.1	.1	2.5	10.0	43.7	43.6	Silty clay.
S57La-8-4-(4)	15 to 22	B_{22g}	.1	--------	.1	1.7	7.0	32.6	58.5	Clay.
S57La-8-4-(5)	22 to 30	B_{23g}	--------	--------	--------	1.8	7.6	35.4	55.2	Clay.
S57La-8-4-(6)	30 to 42+	C_{1g}	.1	.1	.1	1.8	8.4	37.3	52.2	Clay.

TABLE 12.—*Chemical analyses of selected soils*

[Dashed lines indicate that the determination was not made or that the amount determined was below the minimum reportable value]

Soil type and sample number	Depth	Horizon	Extractable cations						Base saturation	Reaction	Organic carbon	Nitrogen
			Ca	Mg	H	Na	K	Total				
	Inches		*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*Percent*	*pH*	*Percent*	*Percent*
Buxin clay:												
S57La-8-7-(1)	0 to 5	A_{11}	28. 7	12. 7	4. 3	0. 2	1. 3	47. 2	91	6. 7	1. 46	0. 104
S57La-8-7-(2)	5 to 9	A_{12}	25. 4	10. 6	4. 3	. 3	. 8	41. 4	90	6. 8	1. 07	. 085
S57La-8-7-(3)	9 to 21	AC	20. 5	9. 7	3. 4	. 2	. 5	34. 3	90	7. 0	. 95	. 066
S57La-8-7-(4)	21 to 34	C_{11}	17. 7	10. 0	2. 5	. 3	. 5	31. 0	92	7. 3	. 44	. 042
S57La-8-7-(5)	34 to 46	C_{12}	12. 1	9. 6	1. 7	. 4	. 4	24. 2	93	7. 4	. 26	--------
S57La-8-7-(6)	46 to 50+	C_2	10. 1	8. 7	1. 2	. 5	. 4	20. 9	94	7. 4	. 20	--------
Cahaba fine sandy loam:												
S55La-8-2-(1)	0 to 5	A_p	. 7	. 2	1. 7	$<.1$	. 4	3. 0	43	5. 6	. 18	--------
S55La-8-2-(2)	5 to 9	B_a	1. 3	. 3	2. 3	$<.1$	. 4	4. 3	46	5. 5	. 15	--------
S55La-8-2-(3)	9 to 16	B_1	1. 3	. 4	2. 3	$<.1$	. 3	4. 3	46	5. 5	. 11	--------
S55La-8-2-(4)	16 to 29	B_2	2. 7	. 7	2. 5	$<.1$	. 2	6. 1	59	5. 2	. 06	--------
S55La-8-2-(5)	29 to 42	B_3	2. 2	. 8	2. 3	$<.1$	. 2	5. 5	58	5. 2	. 04	--------
S55La-8-2-(6)	42 to 52+	C	1. 7	. 7	1. 7	$<.1$	. 3	4. 4	61	5. 4	. 02	--------
Ruston fine sandy loam, hard substratum:												
S57La-8-1-(1)	0 to 6	A_p	1. 4	. 5	3. 2	------	. 2	5. 3	40	5. 7	1. 01	. 059
S57La-8-1-(2)	6 to 10	B_1	1. 0	. 5	2. 8	------	. 1	4. 4	36	5. 3	. 28	. 025
S57La-8-1-(3)	10 to 18	B_{21}	1. 2	1. 4	5. 7	------	. 1	8. 4	32	5. 2	. 24	. 027
S57La-8-1-(4)	18 to 24	B_{22}	. 8	1. 7	7. 0	------	. 1	9. 6	27	5. 2	. 14	. 021
S57La-8-1-(5)	24 to 29	B_3	. 4	1. 4	7. 0	------	. 1	8. 9	21	5. 1	. 12	--------
S57La-8-1-(6)	29 to 36	D_1	------	1. 2	6. 1	------	. 1	7. 4	18	5. 2	. 07	--------
S57La-8-1-(7)	36 to 46+	D_2	------	1. 5	6. 6	------	. 1	8. 2	21	5. 2	. 09	--------
Tilden very fine sandy loam:												
S57La-8-3-(1)	0 to 5	A_p	1. 4	. 8	2. 0	------	. 2	4. 4	54	6. 1	. 45	. 038
S57La-8-3-(2)	5 to 11	B_{21}	1. 7	1. 6	5. 7	. 1	. 2	9. 3	39	5. 0	. 20	. 026
S57La-8-3-(3)	11 to 17	B_{22}	------	1. 5	9. 4	------	. 2	11. 1	15	4. 7	. 14	. 029
S57La-8-3-(4)	17 to 25	B_{23}	------	1. 2	10. 7	. 1	. 2	12. 2	12	4. 8	. 11	. 026
S57La-8-3-(5)	25 to 33	B_{31}	------	1. 0	8. 6	. 1	. 1	9. 8	12	5. 0	. 06	--------
S57La-8-3-(6)	33 to 44	B_{32mg}	------	. 9	6. 1	. 1	. 1	7. 2	15	5. 1	. 05	--------
S57La-8-3-(7)	44 to 54+	D_g	------	4. 8	17. 2	1. 1	. 4	23. 5	27	4. 6	. 06	--------
Wrightsville silt loam:												
S56La-8-3-(1)	0 to 2	A_{21}	5. 7	2. 7	7. 5	. 2	. 3	16. 4	54	5. 5	2. 43	. 116
S56La-8-3-(2)	2 to 11	A_{22}, A_3	2. 6	1. 6	4. 8	. 1	. 1	9. 2	48	5. 0	. 59	--------
S56La-8-3-(3)	11 to 23	B_2	3. 4	2. 6	6. 3	. 2	. 2	12. 7	50	5. 0	. 04	--------
S56La-8-3-(4)	23 to 28	A_{2b}	3. 4	3. 2	7. 0	. 4	. 2	14. 2	51	5. 0	. 14	. 021
S56La-8-3-(5)	28 to 40	B_{21b}	6. 6	6. 1	8. 3	. 8	. 4	22. 2	63	5. 0	. 17	. 022
S56La-8-3-(6)	40 to 55	B_{22b}	9. 2	8. 8	6. 4	2. 0	. 4	26. 8	76	5. 2	. 10	--------
S56La-8-3-(7)	55 to 65	--------	10. 2	9. 7	4. 6	2. 0	. 5	27. 0	83	5. 0	. 10	--------
S56La-8-3-(8)	65 to 90	--------	15. 8	9. 8	. 2	4. 0	. 5	30. 3	99	8. 0	. 04	--------
Wrightsville silty clay:												
S57La-8-4-(1)	0 to 2	A_1	5. 8	5. 8	28. 8	. 1	. 8	34. 4	30	4. 5	5. 61	. 290
S57La-8-4-(2)	2 to 8	A_{2g}	. 6	4. 8	27. 8	. 1	. 4	28. 6	18	4. 3	1. 88	. 114
S57La-8-4-(3)	8 to 15	B_{21g}	4. 6	7. 9	18. 2	. 5	. 4	28. 0	42	4. 4	. 50	. 032
S57La-8-4-(4)	15 to 22	B_{22g}	10. 6	12. 8	18. 6	1. 1	. 5	38. 0	57	4. 4	. 41	. 019
S57La-8-4-(5)	22 to 30	B_{23g}	12. 7	14. 2	12. 4	1. 6	. 5	36. 5	70	4. 4	. 26	. 018
S57La-8-4-(6)	30 to 42+	C_{1g}	13. 9	15. 5	8. 2	2. 6	. 5	35. 7	80	4. 6	. 19	--------

Chemical and Mineralogical Data [3]

Samples of important agricultural soils in Bossier Parish were collected for physical, chemical, and mineralogical characterization. Data were obtained from samples of three soil profiles of each of three series. The Miller series was the heaviest, the Yahola was intermediate, and the Tilden was lightest in texture. Chemical analyses consisted of measurements of total nitrogen, total exchange capacity, exchangeable cations, exchangeable hydrogen, pH, and available phosphorus. X-ray analyses of the clay fraction of certain horizons were obtained and interpreted in terms of types and amounts of clay present.

Some of the chemical data are reported in table 13. The values presented are averages for the surface horizons and for lower horizons of each soil type. The Yahola and Miller soils, derived from recent Red River alluvium, were better supplied with plant nutrients than the more highly weathered Tilden very fine sandy loam, derived from Pleistocene terrace material. The younger soils contained 1.5 to 4.5 times the total nitrogen, 7 to 9 times

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[3] This section was adapted, with slight revision, from "Range in Chemical Properties of Certain Agricultural Soils in Bossier Parish, Louisiana" by M. STELLY, M. D. ABEDI, and B. N. DRISKELL, in *Report of Projects, Department of Agronomy, for 1959*, published by the Louisiana State University Agricultural Experiment Station.

TABLE 13.—*Chemical analyses of Tilden, Yahola, and Miller soils*

Soil type	Horizon	Nitrogen	Available phosphorus[1]	Exchangeable cations					Cation exchange capacity	Base saturation	Reaction
				Ca	Mg	K	Na	H			
		Percent	*Parts per million*	*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*meq./100 gm.*	*Percent*	*pH*
Miller clay (profile 1)	A_p	0.129	102	45.35	3.42	0.87	0.23	(2)	49.9	100	7.2
	AC	.087	64	24.33	3.03	.56	.37	(2)	29.3	100	7.2
Miller silty clay (profiles 2 and 3).	A_p	.105	121	20.68	3.29	.36	.22	(2)	24.5	100	7.3
	AC	.069	95	22.45	3.31	.32	.29	(2)	26.3	100	7.3
Yahola silt loam (profiles 4 and 5).	A_1	.049	115	5.58	2.28	.20	.27	(2)	8.3	100	7.5
	C_1	.021	87	4.81	2.10	.15	.24	(2)	7.3	100	7.7
Yahola very fine sandy loam (profile 6).	A_1	.048	141	3.50	.92	.30	.09	(2)	4.8	100	7.5
	C_1	.027	117	2.52	2.12	.15	.11	(2)	4.9	100	7.5
Tilden very fine sandy loam (profiles 7, 8, and 9).	A_p	.027	15	1.28	.86	.20	.13	2.0	4.2	53	5.8
	B_2	.027	7	1.90	1.03	.24	.15	5.6	8.9	39	5.2

[1] Extracted from a mixture of 1 part of soil to 20 parts of a solution of 0.03 N NH_4F in 0.1 N HCl, shaken for 20 minutes before filtration.

[2] Trace.

the available phosphorus, many times as much exchangeable calcium and magnesium, generally more potassium and sodium, but less exchangeable hydrogen, in comparison with the older Tilden soil. In general, the cation exchange capacities of the Yahola and Miller soils were high and generally saturated with bases. The Tilden soil is likely to need lime because of its low base status and relatively high acidity. The Tilden subsoil had a higher cation exchange capacity and a lower percentage of base saturation than the corresponding surface soil, but this relationship between horizons was not consistent with the younger alluvial soils studied. Calcium and magnesium predominated as exchangeable bases, particularly in the Yahola and Miller series. The potassium content varied considerably, and the amount of exchangeable sodium present exceeded that of potassium in certain instances.

Results of X-ray studies, reported in tables 14, 15, and 16, show that the types, amounts, and distribution of clay varied in these nine profiles. The clay in Tilden profiles was more dominantly kaolinitic, whereas the clay in Miller and Yahola profiles was predominantly montmorillonitic. The surface horizons of the Tilden series contained moderate amounts of kaolinite, chlorite or vermiculite, illite, and quartz, but no montmorillonite. The absence of montmorillonitic clay and the small amount of clay present appear to be associated with the generally low fertility of Tilden soils. Profiles of the Yahola series showed that montmorillonite, illite, and kaolinite clays were distributed in moderate amounts in the surface soil, and that about the same quantities of illite and kaolinite but larger amounts of montmorillonite were present in lower horizons. A minor amount of vermiculite was indicated in both surface layers and C

TABLE 14.—*Mineralogical data on profile samples of Miller soils*

Soil type and mineral components	Soil horizon			
	A_p	AC	C	C_2
	Percent	*Percent*	*Percent*	*Percent*
Profile 1 (Miller clay):				
Kaolinite	10 to 40	10 to 40		10 to 40.
Illite	10 to 40	10 to 40		10 to 40.
Montmorillonite	10 to 40	10 to 40		10 to 40.
Vermiculite		Less than 10[1]		
Quartz	Less than 10	Less than 10		Less than 10.
Profile 2 (Miller silty clay):				
Kaolinite	10 to 40		10 to 40	
Illite	10 to 40		10 to 40	
Montmorillonite	10 to 40		10 to 40	
Vermiculite	Less than 10[1]		Less than 10[1]	
Quartz	Less than 10		Less than 10	
Profile 3 (Miller silty clay):				
Kaolinite	10 to 40	10 to 40		10 to 40.
Illite	10 to 40	10 to 40		10 to 40.
Montmorillonite	10 to 40	10 to 40		10 to 40.
Vermiculite		Less than 10[1]		Less than 10.[1]
Quartz	Less than 10	Less than 10		Less than 10.

[1] The identification of this mineral is uncertain.

TABLE 15.—*Mineralogical data on profile samples of Yahola soils*

Soil type and mineral components	Soil horizon				
	A_1	AC	C_1	C_2	C_3
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
Profile 4 (Yahola silt loam):					
Kaolinite	10 to 40	10 to 40	—	10 to 40	
Illite	10 to 40	10 to 40	—	10 to 40	
Montmorillonite	10 to 40	10 to 40	—	More than 40	
Vermiculite	Less than 10 [1]	Less than 10 [1]	—	Less than 10 [1]	
Quartz	Less than 10	Less than 10	—	Less than 10	
Profile 5 (Yahola silt loam):					
Kaolinite	10 to 40	—	10 to 40	—	10 to 40.
Illite	10 to 40	—	10 to 40	—	10 to 40.
Montmorillonite	10 to 40	—	More than 40	—	More than 40.
Vermiculite	—	—	Less than 10 [1]	—	
Quartz	Less than 10	—	Less than 10	—	Less than 10.
Profile 6 (Yahola very fine sandy loam):					
Kaolinite	10 to 40	—	—	10 to 40	
Illite	10 to 40	—	—	10 to 40	
Montmorillonite	10 to 40	—	—	More than 40	
Quartz	Less than 10	—	—	Less than 10	

[1] The identification of this mineral is uncertain.

horizons of some Yahola profiles. The predominant clay minerals in the Miller soils were very similar to those in the Yahola soils, namely, montmorillonite, illite, kaolinite, and vermiculite. The primary mineralogical difference between the Yahola and Miller soils appeared to be the much larger amounts of clay in the Miller soil profiles.

Based on the results presented, the higher productivity of the Miller and Yahola soils can be attributed to a large degree to the higher fertility levels of these soils as compared to the Tilden soil. The Miller and Yahola soils, derived from Red River alluvium, are, in general, similar to the corresponding Sharkey and Commerce soils, mapped in nearby parishes but derived from Mississippi River alluvium.

TABLE 16.—*Mineralogical data on profile samples of Tilden very fine sandy loam*

Profile number and mineral components	Soil horizon					
	A_p	A_{2p}	B_2	B_{21}	B_{3m}	B_{3m2}
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Profile 7:						
Halloysite or kaolinite	—	—	—	—	10 to 40	
Kaolinite	—	10 to 40	—	—	—	
Illite	—	10 to 40	—	—	10 to 40	
Montmorillonite	—	—	—	—	10 to 40	
Vermiculite or chlorite	—	10 to 40	—	—	10 to 40	
Quartz	—	Less than 10	—	—	Less than 10	
Feldspar	—	Less than 10	—	—	—	
Profile 8:						
Kaolinite	10 to 40	—	—	10 to 40	10 to 40	
Illite	10 to 40	—	—	10 to 40	10 to 40	
Montmorillonite	—	—	—	—	10 to 40 [1]	
Vermiculite	—	—	—	10 to 40 [2]	(1)	
Quartz	10 to 40	—	—	10 to 40	—	
Feldspar	Less than 10	—	—	—	—	
Chlorite or vermiculite	10 to 40	—	—	—	(1)	
Profile 9:						
Halloysite or kaolinite	—	—	—	—	—	10 to 40.
Kaolinite	—	10 to 40	10 to 40	—	—	
Illite	—	10 to 40	10 to 40	—	—	10 to 40.
Vermiculite or chlorite	—	10 to 40	10 to 40	—	—	
Quartz	—	10 to 40	Less than 10	—	—	Less than 10.
Feldspar	—	Less than 10	—	—	—	

[1] This is a combination of montmorillonite with illite, chlorite, or vermiculite.

[2] The identification of this mineral is uncertain.

Engineering Properties of Soils[4]

This soil survey of Bossier Parish, Louisiana, contains information that can be used by engineers to—

1. Make preliminary estimates of soil properties that affect the planning and design of agricultural drainage systems, farm ponds, irrigation systems, terraces, and flood prevention structures.
2. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway and airport locations and in planning detailed investigations of selected locations.
3. Estimate probable loss of time in construction caused by wetness of soil under average weather conditions.
4. Locate sand and gravel for use in construction.
5. Correlate performance of engineering structures with soil mapping units and thus make a general estimate of the hazards or useful properties of various soils for highways and earth construction when definite laboratory data are unavailable.
6. Determine the suitability of soil units for cross-country movement of vehicles and construction equipment.
7. Make soil and land use studies that will aid in the selection and development of industrial, business, residential, and recreational sites.
8. Supplement information obtained from other published maps and reports and aerial photographs, for the purpose of making soil maps and reports especially designed for use by engineers.

The mapping and descriptive reports are somewhat generalized, however, and should be used only in planning more detailed field surveys to determine the in-place condition of the soil at the site of the proposed engineering construction. Sampling and testing will still be needed before specific engineering works are designed and constructed.

Only the data in table 17 are from actual laboratory tests. The estimates in tables 18 and 19 are based on comparison with soils tested. At many construction sites there are major variations in the soil within the depth of the proposed excavations and several different soils within a short distance. Specific laboratory data on mechanical analysis, liquid limit, and plasticity index should be determined for the soil at the site before any engineering work is planned in detail.

Some of the terms used by the soil scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, sand, aggregate, and granular—have special meanings in soil science. Most of these terms, as well as other special terms that are used in the soil survey report, are defined in the Glossary at the back of this report.

Some of the information useful for engineering can be obtained from the soil map. It will often be necessary, however, to refer to other parts of the report. By using the information in the soil map, the profile descriptions, and in the table in this section, the soils engineer can plan a detailed survey of the soil at the construction site.

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[4] H. J. FOREMAN, engineering specialist, Soil Conservation Service, assisted in the preparation and review of this section.

TABLE 17.—*Engineering test data for soil samples*

[Tests were made in the Louisiana Department of Highways Central Laboratory in Baton Rouge or in the District Laboratory in Bossier
somewhat from results that would have been obtained by the Soil Conservation Service laboratories, in which the pipette method is
are suitable for naming Louisiana Department of Highways textural classes]

Soil name and location	Louisiana Department of Highways laboratory report number	Depth	Mechanical analysis							
			Percentage passing sieve number—				Percentage in size ranges			
			10	40	200	270	Gravel (76.0 to 2.00 mm.)	Coarse sand (2.00 to 0.42 mm.)	Fine sand (0.42 to 0.074 mm.)	Silt (0.074 to .005 mm.)
Boswell fine sandy loam:		*Inches*								
Sec. 16, T. 22 N., R. 13 W., 0.6 mile southwest of Plain Dealing on State Highway 162, 40 feet east of road.	61–1136	0 to 6	88	84	50	46	[1] 12	4	34	44
	61–1137	7 to 36	100	100	84	82	--------	--------	16	25
	61–1138	36 to 48	100	100	86	84	--------	--------	14	27
Sec. 33, T. 22 N., R. 13 W., 1.0 mile west of Bolinger on fire tower road, 30 feet east of road.	4–17351	0 to 6	100	88	12	-----	--------	12	75	1
	4–17352	6 to 28	100	100	90	(4)	--------	--------	10	29
	4–17353	28 to 42	100	99	93	(4)	--------	--------	7	29
Buxin clay:										
Sec. 28, T. 23 N., R. 14 W., 150 feet east of levee and 50 feet north of fence.	61–1186	0 to 5	100	100	98	97	--------	--------	2	23
	61–1187	9 to 17	100	100	86	82	--------	--------	14	48
	61–1188	35 to 40	100	100	87	84	--------	--------	13	63
Sec. 11, T. 23 N., R. 14 W., along road 281 feet east of west fence line, then 115 feet north of center of road.	61–1183	0 to 6	100	100	99	99	--------	--------	1	14
	61–1184	9 to 21	100	100	95	94	--------	--------	5	31
	61–1185	34 to 46	100	100	87	85	--------	--------	13	47

See footnotes at end of table.

Engineering Classification Systems

Two systems for classifying soils are in general use among engineers. Both will be used in this report. These classification systems are explained in the PCA Soil Primer (*11*).

AASHO classification system

Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials (*1*). All soil materials are classified in seven principal groups, based on mechanical analyses and plasticity test data. The groups range from A–1 (gravelly soils of high bearing capacity, the best soils for subgrades) to A–7 (clay soils having low strength when wet, the poorest soils for subgrades).

Within each of the principal groups, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index numbers for several of the soils of Bossier Parish are shown in parentheses, following the soil group symbol, in the next to last column in table 17. The estimated AASHO classification of each of the soils in the parish is given in table 18.

Unified classification system

Some engineers prefer to use the Unified soil classification system established by the Waterways Experiment Station, Corps of Engineers (*18*). This system recognizes 8 classes of coarse-grained soils, 6 classes of fine-grained soils, and highly organic soils. An approximate classification can be made in the field by visual examination and simple manipulation tests (*17*). For exact classification, mechanical analyses are needed and these analyses must be supplemented by standard tests for liquid limit and plastic limit for some soils. Table 17 gives the estimated Unified classification of the soils tested.

Soil Data Related to Engineering

Samples representing the major soil types in the parish were tested by the Louisiana Department of Highways, using standard procedures. The results are reported in table 17.

The series to be sampled were chosen because they covered large areas of the parish or because they represented a broad group of similar soils. Only profiles within the normal range for the soil type were sampled. To establish the range in various properties characteristic of each soil series, samples were taken at two or more locations, generally more than a mile apart. The depths from which the samples were taken generally correspond to the major soil horizons.

Tables 18 and 19 are based on the data in table 17. In table 18, properties of the soils that would affect their use for engineering purposes are given for the soils tested, and the properties of the other soils of the parish are estimated by considering the known similarities to and differences from the soils sampled. The suitability of each type of soil for various kinds of construction is estimated in table 19.

taken from 52 soil profiles, representing 24 soils

City. Mechanical analyses were made by combined sieve and hydrometer methods. In many tests, results by this procedure differ used for clay determinations. The mechanical analyses in this table are not suitable for use in naming USDA textural classes of soils but

Mechanical analysis—Continued		Physical characteristics					Engineering soil classification		
Percentage in size ranges—Continued									
Clay (less than 0.005 mm.)	Colloids (less than 0.0001 mm.)	Liquid limit	Plastic limit	Plasticity index	Shrinkage limit	Shrinkage ratio	Louisiana Department of Highways	AASHO	Unified
6	3	19	18	1	17	1. 76	Gravelly silt loam	A–4(3)	SM.
59	52	50	32	18	17	1. 76	Medium silty clay	A–7–5(13)	ML–MH.
59	52	58	31	27	16	1. 81	Medium silty clay	A–7–5(18)	MH–CH.
12	6	----------	(2)	----------	(3)	----------	Sandy loam	A–2–4(0)	SP–SM.
61	50	62	31	31	19	1. 86	Heavy clay	A–7–5(20)	CH–MH.
64	54	66	30	36	20	1. 77	Heavy clay	A–7–5(20)	CH.
75	53	53	23	30	7	1. 92	Heavy clay	A–7–6(19)	CH.
38	28	28	18	10	11	1. 84	Light silty clay	A–4(8)	CL.
24	19	28	20	8	14	1. 79	Silty clay loam	A–4(8)	CL.
85	59	65	31	34	3	2. 00	Heavy clay	A–7–5(20)	CH–MH.
64	41	43	24	19	10	1. 92	Medium silty clay	A–7–6(12)	CL.
40	30	34	18	16	7	1. 97	Light silty clay	A–6(10)	CL.

TABLE 17.—*Engineering test data for soil samples taken*

Soil name and location	Louisiana Department of Highways laboratory report number	Depth	Mechanical analysis							
			Percentage passing sieve number—				Percentage in size ranges			
			10	40	200	270	Gravel (76.0 to 2.00 mm.)	Coarse sand (2.00 to 0.42 mm.)	Fine sand (0.42 to 0.074 mm.)	Silt (0.074 to .005 mm.)
Cahaba fine sandy loam:										
Sec. 14, T. 22 N., R. 12 W., 0.9 mile west of intersection of State Highway 536 and State Highway 2, 150 feet south of road, about 6 miles east of Plain Dealing.	468643	0 to 10	100	100	31	31	--------	--------	75	19
	468644	18 to 32	100	100	44	43	--------	--------	64	25
	468645	36 to 46	100	100	39	39	--------	--------	68	24
Sec. 1, T. 20 N., R. 12 W., 4.6 miles northeast of State Highway 162 on State Highway 157, 60 feet west of center of road, near Ivan.	468652	0 to 10	100	100	37	37	--------	--------	70	25
	468653	16 to 30	100	100	45	45	--------	--------	63	25
	468654	32 to 42	100	100	29	29	--------	--------	77	17
Sec. 36, T. 21 N., R. 12 W., 1.6 miles south of intersection of State Highway 157 and State Highway 160, 80 feet east of center of road, near Ivan.	4–17371	0 to 6	100	99	56	(4)	--------	(5)	44	46
	4–17372	6 to 32	100	100	66	(4)	--------	--------	34	41
	4–17373	32 to 42	100	100	60	(4)	--------	--------	40	39
Gallion silt loam:										
Sec. 7, T. 18 N., R. 12 W., 1.3 miles north of U.S. Highway 80 on local road, 175 feet west of road, about 5 miles east of Bossier City.	4–17382	0 to 8	100	100	96	(4)	--------	--------	4	75
	4–17383	8 to 20	100	100	96	(4)	--------	--------	4	51
	4–17384	20 to 36	100	100	95	(4)	--------	--------	5	57
Sec. 7, T. 18 N., R. 12 W., 1.6 miles north of U.S. Highway 80 on local road, 60 feet west of road.	417385	0 to 12	100	100	99	(4)	--------	--------	(5)	85
	417386	12 to 24	100	100	99	(4)	--------	--------	(5)	76
	417387	34 to 56	100	99	98	(4)	--------	(5)	2	74
Kirvin fine sandy loam:										
Sec. 9, T. 21 N., R. 12 W., 0.1 mile north of intersection of State Highway 157 and State Highway 160, 40 feet northwest of road, near Rocky Mount.	468365	0 to 18	100	100	41	41	--------	--------	74	20
	468366	18 to 36	100	100	62	62	--------	--------	58	21
	468367	42 to 50	100	100	65	64	--------	--------	46	22
Sec. 9, T. 18 N., R. 11 W., 0.5 mile east of intersection of U.S. Highway 80 and State Highway 157, 50 feet north of U.S. Highway 80, near Fillmore.	468359	0 to 12	100	100	63	63	--------	--------	80	16
	468360	12 to 36	100	100	67	67	--------	(5)	53	18
	468361	45 to 60	100	100	84	84	--------	--------	23	34
Sec. 5, T. 22 N., R. 13 W., 1.25 miles west of State Highway 3 on local road, 1 mile north of Plain Dealing, 60 feet northeast of local road.	468368	0 to 8	100	95	64	64	--------	--------	62	30
	468369	8 to 36	100	100	77	77	--------	--------	54	25
	468370	42 to 50	100	100	74	74	--------	--------	40	29
Lakeland loamy fine sand:										
Sec. 4, T. 22 N., R. 13 W., 4.5 miles south of intersection of State Highway 2 and State Highway 3 on State Highway 3, 50 feet south of road, near Plain Dealing.	611133	0 to 6	100	100	24	23	--------	--------	76	22
	611134	6 to 30	100	100	26	25	--------	--------	74	21
	611135	42 to 60	100	99	19	18	--------	1	81	14
Sec. 30, T. 22 N., R. 13 W., 1.0 mile west of intersection of State Highway 162 and local road, 500 feet north of local road.	611139	0 to 12	100	97	21	20	--------	3	76	17
	611140	12 to 36	100	97	26	25	--------	3	71	19
	611141	40 to 60	100	98	25	24	--------	2	75	18
Sec. 13, T. 22 N., R. 14 W., 3.3 miles east of Plain Dealing, 200 feet north of State Highway 2.	611148	0 to 10	100	100	16	15	--------	--------	84	12
	611149	18 to 48	100	100	17	16	--------	--------	83	12
	611150	48 to 56	100	100	4	4	--------	--------	96	3
Luverne fine sandy loam:										
Sec. 9, T. 21 N., R. 12 W., 0.4 mile north of intersection of State Highway 157 and State Highway 160, 60 feet north of road, near Rocky Mount.	468362	0 to 14	100	100	51	51	--------	--------	61	29
	468363	18 to 36	100	100	68	68	--------	--------	47	27
	468364	40 to 54	100	100	67	-----	--------	--------	50	24
Sec. 9, T. 18 N., R. 11 W., 0.7 mile east of intersection of U.S. Highway 80 and State Highway 157, 100 feet east of U.S. Highway 80, near Fillmore.	468356	0 to 10	100	100	42	42	--------	--------	72	18
	468357	18 to 30	100	100	55	55	--------	--------	61	18
	468358	30 to 42	100	100	52	52	--------	--------	56	17

See footnotes at end of table.

from 52 soil profiles, representing 24 soils—Continued

Mechanical analysis—Continued		Physical characteristics					Engineering soil classification		
Percentage in size ranges—Continued		Liquid limit	Plastic limit	Plasticity index	Shrinkage limit	Shrinkage ratio	Louisiana Department of Highways	AASHO	Unified
Clay (less than 0.005 mm.)	Colloids (less than 0.0001 mm.)								
6	---	---	(2)	---	(3)	---	Sandy loam	A-2-4(0)	SM.
11	---	---	(2)	---	(3)	---	Sandy loam	A-4(2)	SM.
8	---	---	(2)	---	(3)	---	Sandy loam	A-4(1)	SM.
5	---	---	(2)	---	(3)	---	Sandy loam	A-4(0)	SM.
12	---	22	15	7	12	1. 85	Sandy loam	A-4(2)	SM-SC.
6	---	---	(2)	---	(3)	---	Sandy loam	A-2-4(0)	SM.
10	5	(2)	(2)	(2)	(3)	(3)	Loam	A-4(4)	ML.
25	15	23	11	12	15. 8	1. 91	Clay loam	A-6(7)	CL.
21	14	19	18	1	16. 1	1. 86	Clay loam	A-4(5)	ML.
21	11	24	(2)	(2)	(3)	(3)	Silty clay loam	A-4(8)	ML.
45	30	51	18	33	18. 8	1. 81	Silty clay	A-7-6(18)	CH.
38	28	35	15	20	16. 3	1. 84	Silty clay	A-6(12)	CL.
15	10	24	(2)	(2)	(3)	(3)	Silt	A-4(8)	ML.
24	18	32	20	12	8. 2	1. 80	Silty clay loam	A-6(9)	CL.
24	20	27	18	9	22. 0	1. 71	Silty clay loam	A-4(8)	CL.
6	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-4(1)	SM.
21	---	30	20	10	16	1. 87	Sandy clay loam	A-4(5)	CL.
32	---	36	24	12	17	1. 80	Light sandy clay	A-6(7)	CL-ML.
4	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-4(6)	ML.
29	---	38	23	15	19	1. 82	Sandy clay loam	A-6(8)	CL-ML.
43	---	62	36	26	18	1. 62	Light silty clay	A-7-5(18)	MH.
8	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-4(6)	ML.
21	---	27	16	11	14	1. 96	Sandy clay loam	A-6(8)	CL.
32	---	43	29	14	19	1. 78	Light sandy clay	A-7-6(10)	ML.
2	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-2-4(0)	SM.
5	2	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-2-4(0)	SM.
4	2	(2)	(2)	(2)	(3)	(3)	Sand	A-2-4(0)	SM.
4	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-2-4(0)	SM.
7	2	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-2-4(0)	SM.
5	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-2-4(0)	SM.
4	---	(2)	(2)	(2)	(3)	(3)	Sand	A-2-4(0)	SM.
5	2	(2)	(2)	(2)	(3)	(3)	Sand	A-2-4(0)	SM.
1	---	(2)	(2)	(2)	(3)	(3)	Sand	A-3(0)	SP.
10	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-4(3)	ML.
26	---	28	16	12	15	1. 88	Clay loam	A-6(7)	CL.
26	---	28	17	11	13	1. 91	Sandy clay loam	A-6(7)	CL.
10	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-4(1)	SM.
21	---	25	15	10	12	1. 90	Sandy clay loam	A-4(4)	CL.
27	---	32	20	12	12	1. 76	Sandy clay loam	A-6(4)	CL.

TABLE 17.—*Engineering test data for soil samples taken*

Soil name and location	Louisiana Department of Highways laboratory report number	Depth	Mechanical analysis							
			Percentage passing sieve number—				Percentage in size ranges			
			10	40	200	270	Gravel (76.0 to 2.00 mm.)	Coarse sand (2.00 to 0.42 mm.)	Fine sand (0.42 to 0.074 mm.)	Silt (0.074 to .005 mm.)
Luverne loamy fine sand:										
Sec. 7, T. 22 N., R. 13 W., 2.2 miles west of Plain Dealing, 60 feet north of State Highway 537.	468371	0 to 20	100	100	22	22	--------	--------	88	10
	468372	20 to 50	100	100	39	39	--------	--------	69	13
	468373	50 to 80	100	100	29	29	--------	--------	76	6
Miller clay:										
Sec. 31, T. 16 N., R. 11 W., 1.2 miles south of Elm Grove on U.S. Highway 71, 100 feet west of road.	61–1180	0 to 7	100	100	99	99	--------	--------	1	27
	61–1181	12 to 21	100	100	100	100	--------	--------	--------	18
	61–1182	39 to 46	100	100	98	97	--------	--------	2	21
Sec. 23, T. 18 N., R. 13 W., 70 feet west of Swan Lake road.	61–1169	0 to 12	100	100	99	99	--------	--------	1	35
	61–1170	12 to 40	100	99	97	97	--------	[6] 1	2	34
Sec. 26, T. 19 N., R. 13 W., 4.5 miles east of intersection of State Highway 3 and Linton road on Swan Lake road, 50 feet north of road.	4–17380	0 to 12	100	100	99	-----	--------	--------	(5)	28
	4–17381	12 to 40	100	100	100	-----	--------	--------	--------	2
Morse clay:										
Sec. 5, T. 20 N., R. 11 W., on local road, 200 feet west of Tidwell Branch, 60 feet south of road.	4–17374	0 to 6	100	100	92	-----	--------	--------	8	20
	4–17375	20 to 42	100	100	92	-----	--------	--------	8	19
Sec. 8, T. 20 N., R. 11 W., 0.6 mile east of intersection of Whittington road and State Highway 157, near Bayou Bodcau Reservoir and spillway.	5–17376	0 to 18	100	98	92	-----	--------	[6] 2	6	28
	5–17377	20 to 42	100	99	97	-----	--------	(5)	3	19
Morse clay, dark surface:										
Sec. 8, T. 21 N., R. 11 W., 0.3 mile south of bridge on Phillips Creek, 30 feet east of State Highway 529.	468649	0 to 6	100	100	87	85	--------	--------	37	45
	468650	6 to 20	100	100	96	96	--------	--------	22	35
	468651	24 to 42	100	100	100	100	--------	--------	8	34
Prentiss very fine sandy loam, clay substratum:										
Sec. 12, T. 22 N., R. 12 W., 0.4 mile east of intersection of State Highway 536 on State Highway 2, 80 feet north of road, east of Plain Dealing.	468646	0 to 8	100	100	49	49	--------	--------	59	31
	468647	14 to 28	100	100	63	61	--------	--------	54	32
	468648	30 to 42	100	100	54	52	--------	--------	61	28
Sec. 12, T. 20 N., R. 11 W., 5.0 miles south of intersection of State Highway 160 and State Highway 157, 60 feet south of State Highway 157, south of Ivan.	61–1166	0 to 8	100	99	62	59	--------	1	37	50
	61–1167	12 to 28	100	99	75	72	--------	1	24	44
	61–1168	30 to 40	100	99	73	69	--------	1	26	47
Sec. 11, T. 20 N., R. 12 W., 5.5 miles south of intersection of State Highway 160 and State Highway 157, 80 feet north of State Highway 157, south of Ivan.	61–1162	0 to 7	100	99	66	63	--------	1	33	56
	61–1163	11 to 20	100	98	69	66	--------	2	29	48
	61–1164	36 to 46	100	99	72	70	--------	1	27	37
Ruston fine sandy loam:										
Sec. 6, T. 21 N., R. 13 W., 4.1 miles north of intersection of State Highway 160 and State Highway 162, 30 feet west of road, near Benton.	468637	0 to 12	100	100	37	37	--------	--------	72	20
	468638	16 to 28	100	100	42	42	--------	--------	64	21
	468639	40 to 54	100	100	43	43	--------	--------	63	24
Ruston fine sandy loam, hard substratum:										
Sec. 26, T. 21 N., R. 13 W., 3.75 miles east of intersection of State Highway 160 and State Highway 3, near Swindleville.	61–1142	0 to 10	100	99	60	57	--------	1	39	50
	61–1143	16 to 26	90	88	66	63	10	1	20	34
	61–1144	38 to 50	94	98	73	70	6	1	23	38
Sec. 24, T. 20 N., R. 14 W., 4.2 miles south of State Highway 160 on State Highway 162.	468631	0 to 10	100	100	54	52	--------	--------	58	34
	468632	16 to 28	100	100	68	67	--------	--------	43	29
	468633	32 to 42	100	100	69	67	--------	--------	42	31

See footnotes at end of table.

from 52 soil profiles, representing 24 soils—Continued

Mechanical analysis—Continued		Physical characteristics					Engineering soil classification		
Percentage in size ranges—Continued		Liquid limit	Plastic limit	Plasticity index	Shrinkage limit	Shrinkage ratio	Louisiana Department of Highways	AASHO	Unified
Clay (less than 0.005 mm.)	Colloids (less than 0.0001 mm.)								
2	---	(2)	(2)	(2)	(3)	(3)	Sand	A-2-4(0)	SM.
18	---	23	14	9	15	1. 69	Sandy loam	A-4(1)	SC.
18	---	22	16	6	17	1. 79	Sandy loam	A-2-4(0)	SM-SC.
72	50	57	28	29	6	1. 92	Heavy clay	A-7-6(19)	CH.
82	53	55	30	25	12	1. 82	Heavy clay	A-7-5(17)	CH-MH.
77	60	72	29	43	8	1. 92	Heavy clay	A-7-6(20)	CH.
64	40	51	26	25	9	1. 99	Medium silty clay	A-7-6(16)	CH.
63	41	51	26	25	9	2. 00	Medium silty clay	A-7-6(16)	CH.
72	40	55	26	29	17. 7	1. 84	Heavy clay	A-7-6(19)	CH.
98	62	63	28	35	8	2. 21	Heavy clay	A-7-6(20)	CH.
72	57	60	22	38	11. 9	2. 01	Heavy clay	A-7-6(20)	CH.
73	54	54	22	32	5. 7	2. 3	Heavy clay	A-7-6(19)	CH.
64	46	59	22	37	12. 0	2. 03	Medium silty clay	A-7-6(20)	CH.
78	52	59	21	38	11. 1	2. 06	Heavy clay	A-7-6(20)	CH.
18	6	32	20	12	26	1. 56	Loam	A-6(9)	CL.
43	14	54	25	29	12	1. 91	Light silty clay	A-7-6(17)	CH.
58	27	76	29	47	11	1. 92	Medium silty clay	A-7-6(20)	CH.
10	2	---	(2)	(2)	(3)	(3)	Sandy loam	A-4(3)	SM.
14	5	---	(2)	(2)	(3)	(3)	Sandy loam	A-4(6)	ML.
11	---	25	16	9	14	1. 80	Sandy loam	A-4(4)	CL.
12	8	18	16	2	16	1. 81	Silt loam	A-4(5)	ML.
31	24	30	18	12	6	2. 14	Light silty clay	A-6(9)	CL.
26	20	26	18	8	13	1. 89	Clay loam	A-4(8)	CL.
10	5	---	(2)	(2)	(3)	(3)	Silt loam	A-4(6)	ML.
21	18	23	16	7	15	1. 86	Clay loam	A-4(7)	ML-CL.
35	32	21	17	4	16	1. 80	Light silty clay	A-4(7)	ML-CL.
8	---	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-4(1)	SM.
15	2	19	13	6	12	1. 83	Sandy loam	A-4(1)	SM-SC.
13	1	(2)	(2)	(2)	(3)	(3)	Sandy loam	A-4(2)	SM.
10	6	16	15	1	15	1. 78	Silt loam	A-4(5)	ML.
35	29	33	22	11	17	1. 84	Gravelly light silty clay	A-6(7)	CL.
32	28	29	19	10	12	1. 98	Gravelly light silty clay	A-4(8)	CL.
8	1	---	(2)	(2)	(3)	(3)	Sandy loam	A-4(4)	ML.
28	16	32	17	15	13	1. 84	Clay loam	A-6(9)	CL.
27	14	31	19	12	13	1. 89	Clay loam	A-6(8)	CL.

TABLE 17.—*Engineering test data for soil samples taken*

Soil name and location	Louisiana Department of Highways laboratory report number	Depth	Mechanical analysis							
			Percentage passing sieve number—				Percentage in size ranges			
			10	40	200	270	Gravel (76.0 to 2.00 mm.)	Coarse sand (2.00 to 0.42 mm.)	Fine sand (0.42 to 0.074 mm.)	Silt (0.074 to .005 mm.)
Ruston fine sandy loam, hard substratum—Con.										
Sec. 34, T. 22 N., R. 13 W., 0.3 mile southeast of railroad crossing on Rocky Mount Road, 20 feet south of road.	61–1171	0 to 6	97	93	42	40	[1] 3	4	49	38
	61–1172	10 to 18	97	95	59	57	[1] 3	2	36	36
	61–1173	36 to 46	82	77	44	42	[1] 18	5	33	24
SE¼SW¼ sec. 23, T. 22 N., R. 13 W., 395 feet south of center of road intersection, then 43 west of center of road.	61–1174	0 to 5	83	81	26	24	[1] 17	2	55	22
	61–1175	17 to 27	93	88	47	46	[1] 7	5	41	23
	61–1176	45 to 55	100	100	46	45	--------	--------	54	14
Sec. 34, T. 22 N., R. 13 W., 0.7 mile east of State Highway 3, 120 feet north of local road.	4–17342	0 to 8	100	99	39	(4)	--------	(5)	61	34
	4–17343	12 to 36	100	100	47	(4)	--------	--------	53	27
	4–17344	42 to 48	100	100	50	(4)	--------	--------	50	27
Savannah and Bowie very fine sandy loams:										
(Savannah very fine sandy loam) Sec. 13, T. 19 N., R. 12 W., 3.0 miles southwest of Bellevue, 60 feet south of Bellevue-Adner road.	4–17353	0 to 12	100	98	61	(4)	--------	2	37	51
	4–17354	12 to 42	100	99	63	(4)	--------	(5)	37	42
	4–17355	42 to 48+	100	98	74	(4)	--------	2	24	64
(Bowie very fine sandy loam) Sec. 18, T. 19 N., R. 11 W., 2.0 miles southwest of Bellevue, 60 feet north of Bellevue-Adner road.	4–17356	0 to 12	100	99	36	(4)	--------	(5)	64	17
	4–17357	12 to 36	100	99	45	(4)	--------	(5)	55	34
	4–17358	40 to 48	100	99	53	(4)	--------	(5)	47	32
(Savannah very fine sandy loam) Sec. 8, T. 19 N., R. 11 W., 0.9 mile south of Bellevue, 60 feet east of State Highway 157.	4–17359	0 to 14	100	99	27	(4)	--------	(5)	73	18
	4–17360	14 to 40	100	100	58	(4)	--------	--------	42	13
	4–17361	40 to 48	100	100	49	(4)	--------	--------	51	14
Shubuta fine sandy loam:										
Sec. 24, T. 20 N., R. 14 W., 1.8 miles north of intersection of State Highway 160 and State Highway 162, 80 feet east of State Highway 162, near Benton.	468634	0 to 10	100	100	60	60	--------	--------	57	35
	468635	12 to 28	100	100	87	86	--------	--------	25	27
	468636	32 to 42	100	97	79	76	--------	3	28	32
Sec. 34, T. 23 N., R. 13 W., 0.2 mile east of Bolinger, 60 feet south of local road.	4–17348	0 to 6	100	86	35	(4)	--------	14	51	29
	4–17349	6 to 28	100	98	80	(4)	--------	2	18	23
	4–17350	30 to 40	100	99	90	(4)	--------	(5)	10	27
Sec. 35, T. 23 N., R. 13 W., 0.6 mile west of intersection of Bolinger road and State Highway 157, 80 feet south of Bolinger road.	61–1145	0 to 6	81	75	29	28	[1] 19	3	49	23
	61–1146	6 to 26	100	99	81	80	--------	1	18	22
	61–1147	30 to 40	100	99	71	70	--------	1	18	26
Shubuta gravelly fine sandy loam:										
Sec. 36, T. 23 N., R. 13 W., 0.3 mile south of intersection of State Highway 157 and local road, 60 feet north of local road.	4–17345	0 to 18	62	60	18	(4)	[1] 38	1	43	12
	4–17346	18 to 36	100	99	65	(4)	--------	(5)	35	12
	4–17347	40 to 48	100	98	41	(4)	--------	2	57	5
Stough silt loam, clay substratum: [7]										
Sec. 12, T. 19 N., R. 11 W., 3.9 miles east of intersection of State Highway 157 and State Highway 528, 50 feet north of State Highway 528.	4–17362	0 to 10	100	100	93	(4)	--------	--------	7	73
	4–17363	12 to 30	100	96	89	(4)	--------	[8] 4	7	65
	4–17364	30 to 40	100	100	94	(4)	--------	--------	6	70
Sec. 11, T. 19 N., R. 11 W., 0.9 mile west of Webster Parish line, on State Highway 528, 80 feet north of road.	4–17365	0 to 6	100	100	91	(4)	--------	--------	9	74
	4–17366	6 to 30	100	100	91	(4)	--------	--------	9	69
	4–17367	33 to 43	100	100	92	(4)	--------	--------	8	70
Sec. 9, T. 19 N., R. 11 W., 0.6 mile east of intersection of State Highway 157 and State Highway 528, 60 feet south of State Highway 528.	4–17368	0 to 8	100	99	85	(4)	--------	(5)	15	67
	4–17369	8 to 30	100	100	89	(4)	--------	--------	11	63
	4–17370	30 to 42	100	100	86	(4)	--------	--------	14	54

See footnotes at end of table.

from 52 soil profiles, representing 24 soils—Continued

Mechanical analysis—Continued		Physical characteristics					Engineering soil classification		
Percentage in size ranges—Continued		Liquid limit	Plastic limit	Plasticity index	Shrinkage limit	Shrinkage ratio	Louisiana Department of Highways	AASHO	Unified
Clay (less than 0.005 mm.)	Colloids (less than 0.0001 mm.)								
6	3	---	(2)	(2)	(3)	(3)	Sandy loam	A-4(1)	SM.
23	18	25	17	8	13	1. 91	Clay loam	A-4(5)	CL.
20	16	28	19	9	15	1. 87	Gravelly clay loam	A-4(2)	SC.
4	---	---	(2)	(2)	(3)	(3)	Gravelly sandy loam	A-2-4(0)	SM.
24	22	28	21	7	15	1. 83	Gravelly clay loam	A-4(2)	SM-SC.
32	20	34	20	14	17	1. 79	Sandy clay	A-6(3)	SC.
5	2	---	(2)	(2)	(3)	(3)	Sandy loam	A-4(1)	SM.
20	15	19	15	4	14	1. 99	Sandy clay loam	A-4(2)	SM-SC.
23	16	24	15	9	15	1. 96	Clay loam	A-4(3)	SC.
10	4	20	(2)	(2)	(3)	(3)	Silt loam	A-4(5)	ML.
21	17	22	15	7	14	1. 99	Clay loam	A-4(6)	ML-CL.
10	7	21	17	4	14	2. 00	Silt loam	A-4(8)	ML-CL.
19	14	17	(2)	(2)	(3)	(3)	Sandy loam	A-4(0)	SM.
11	6	---	(2)	(2)	(3)	(3)	Sandy loam	A-4(2)	SM.
21	16	23	13	10	14. 5	1. 96	Clay loam	A-4(4)	CL.
9	4	---	(2)	(2)	(3)	(3)	Sandy loam	A-2-4(0)	SM.
45	42	42	17	25	18. 2	1. 83	Light sandy clay	A-7-6(11)	CL.
35	28	40	15	25	18. 5	1. 84	Sandy clay	A-6(8)	CL.
8	0	16	14	2	13	1. 91	Sandy loam	A-4(5)	ML.
48	23	55	27	28	15	1. 76	Light silty clay	A-7-6(18)	CH.
37	21	46	25	21	18	1. 74	Light silty clay	A-7-6(14)	CL.
6	---	---	(2)	(2)	(3)	(3)	Sandy loam	A-2-4(0)	SM.
57	52	57	27	30	18. 7	1. 80	Medium silty clay	A-7-6(19)	CH.
63	56	59	26	33	15. 9	1. 89	Medium silty clay	A-7-6(20)	CH.
6	3	---	(2)	(2)	(3)	(3)	Gravelly sandy loam	A-2-4(0)	SM.
59	52	51	32	19	16	1. 75	Medium silty clay	A-7-5(14)	MH.
55	47	49	28	21	15	1. 77	Medium silty clay	A-7-6(13)	ML-CL.
6	2	---	(2)	(2)	(3)	(3)	Gravelly sandy loam	A-2-4(0)	SM.
53	49	51	25	26	22. 4	1. 70	Medium sandy clay	A-7-6(14)	CH.
36	32	25	17	8	21. 9	1. 72	Sandy clay	A-4(1)	SC.
20	9	20	18	2	13. 4	1. 93	Silty clay loam	A-4(8)	ML.
24	11	23	16	7	13. 9	1. 99	Silty clay loam	A-4(8)	CL-ML.
24	12	21	15	6	15. 0	2. 00	Silty clay loam	A-4(8)	CL-ML.
17	8	21	(2)	(2)	(3)	(3)	Silt loam	A-4(8)	ML.
22	11	20	16	4	15. 3	1. 91	Silty clay loam	A-4(8)	CL-ML.
22	14	20	15	5	14. 8	1. 94	Silty clay loam	A-4(8)	CL-ML.
18	8	19	(2)	(2)	(3)	(3)	Silt loam	A-4(8)	ML.
26	15	22	19	3	14. 9	2. 00	Silty clay loam	A-4(8)	ML.
32	19	22	15	7	15. 5	1. 89	Silty clay	A-4(8)	CL-ML.

TABLE 17.—*Engineering test data for soil samples taken*

Soil name and location	Louisiana Department of Highways laboratory report number	Depth	Mechanical analysis							
			Percentage passing sieve number—				Percentage in size ranges			
			10	40	200	270	Gravel (76.0 to 2.00 mm.)	Coarse sand (2.00 to 0.42 mm.)	Fine sand (0.42 to 0.074 mm.)	Silt (0.074 to .005 mm.)
Tilden very fine sandy loam:										
Sec. 36, T. 21 N., R. 12 W., 2.0 miles south of intersection of State Highway 160 and State Highway 157, 70 feet north of State Highway 157.	61–1151	0 to 6	100	99	74	67	--------	[8] 1	25	67
	61–1152	8 to 24	100	100	90	86	--------	--------	10	61
	61–1153	24 to 40	100	100	89	85	--------	--------	11	63
	61–1154	42 to 48	100	100	89	84	--------	--------	11	60
Sec. 30, T. 21 N., R. 11 W., on private road near Ivan, 0.1 mile south of intersection with State Highway 160, 20 feet east of road.	61–1155	0 to 10	100	99	85	80	--------	1	14	76
	61–1156	12 to 24	100	99	90	86	--------	1	9	70
	61–1157	24 to 42	100	99	91	87	--------	1	8	61
	61–1158	42 to 50	100	100	90	85	--------	--------	10	68
Sec. 17, T. 21 N., R. 11 W., 1,288 feet north of intersection of State Highway 160 and State Highway 529, then 157 feet east of center of State Highway 529.	61–1177	0 to 5	99	98	47	47	1	1	51	42
	61–1178	11 to 17	100	99	74	71	--------	1	25	46
	61–1179	44 to 54	100	100	79	76	--------	--------	21	34
Wrightsville silt loam:										
Sec. 14, T. 21 N., R. 12 W., 1.45 miles west of intersection of State Highway 157 and State Highway 160, 66 feet south of State Highway 160.	61–1159	0 to 7	100	99	90	88	--------	1	9	68
	61–1160	7 to 20	100	99	92	89	--------	1	7	54
	61–1161	24 to 48	100	99	93	91	--------	1	6	46
Sec. 14, T. 21 N., R. 12 W., 1.6 miles west of intersection of State Highway 157 and State Highway 160, 75 feet north of State Highway 160.	468625	0 to 8	100	100	97	97	--------	--------	14	52
	468626	10 to 18	100	100	99	99	--------	--------	31	44
	468627	18 to 36	100	100	99	99	--------	--------	15	36
Sec. 27, T. 21 N., R. 13 W., 2.0 miles east of Swindleville on State Highway 160, 100 feet south of road.	468628	0 to 18	100	100	74	74	--------	--------	38	46
	468629	19 to 28	100	100	88	88	--------	--------	23	40
	468630	30 to 42	100	100	88	87	--------	--------	24	58
Wrightsville silty clay:										
Sec. 11, T. 23 N., R. 13 W., 1.45 miles south of the Arkansas line, 160 feet west of State Highway 3.	468622	0 to 5	100	100	98	98	--------	--------	36	37
	468623	11 to 26	100	100	96	96	--------	--------	17	35
	468624	28 to 36	100	100	97	97	--------	--------	14	30
Yahola silt loam:										
Sec. 7, T. 19 N., R. 13 W., 2.0 miles south of intersection of State Highway 162 and State Highway 3, 60 feet east of State Highway 3, near Benton.	4–17378	0 to 6	100	100	99	(4)	--------	--------	(5)	77
	4–17379	8 to 40	100	100	99	(4)	--------	--------	(5)	81
Yahola silt loam (stratified):										
Sec. 21, T. 18 N., R. 13 W., 0.2 mile south of intersection of U.S. Highway 80 and State Highway 782–2, 60 feet south of State Highway 782–2.	4–17388	0 to 16	100	99	81	(4)	--------	(5)	19	68
	4–17389	16 to 28	100	100	99	(4)	--------	--------	(5)	61
	4–17390	28 to 42	100	100	97	(4)	--------	--------	3	64

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[1] Concretions and fragments of ironstone.
[2] Nonplastic.
[3] No shrinkage.
[4] Not reported.

from 52 soil profiles, representing 24 soils—Continued

Mechanical analysis—Continued		Physical characteristics					Engineering soil classification		
Percentage in size ranges—Continued									
Clay (less than 0.005 mm.)	Colloids (less than 0.0001 mm.)	Liquid limit	Plastic limit	Plasticity index	Shrinkage limit	Shrinkage ratio	Louisiana Department of Highways	AASHO	Unified
7	4	18	16	2	17	1.76	Silt loam	A-4(8)	ML.
29	24	25	17	8	11	2.00	Silty clay loam	A-4(8)	CL.
26	22	26	18	8	15	1.84	Silty clay loam	A-4(8)	CL.
29	26	30	20	10	14	1.81	Silty clay loam	A-4(8)	CL.
9	6	----------	(2)	(2)	(3)	(3)	Silt loam	A-4(8)	ML.
20	16	22	17	5	15	1.86	Silty clay loam	A-4(8)	CL-ML.
30	26	28	18	10	15	1.85	Silty clay	A-4(8)	CL.
22	18	25	19	6	8	1.78	Silty clay loam	A-4(8)	CL-ML.
5	2	18	17	1	18	1.68	Sandy loam	A-4(2)	SM.
28	22	27	18	9	12	1.92	Clay loam	A-4(8)	CL.
45	40	43	23	20	8	1.95	Light silty clay	A-7-6(13)	CL.
22	9	24	20	4	21	1.62	Silty clay loam	A-4(8)	CL-ML.
38	25	29	17	12	13	1.88	Silty clay	A-6(9)	CL.
47	36	37	18	19	12	1.89	Light silty clay	A-6(12)	CL.
34	10	46	18	28	14	1.85	Silty clay	A-7-6(16)	CL.
25	----------	25	16	9	14	1.79	Clay loam	A-4(8)	CL.
49	----------	52	20	32	11	1.92	Light silty clay	A-7-5(14)	CH.
16	----------	----------	(2)	(2)	(3)	(3)	Loam	A-4(8)	ML.
37	28	38	20	18	13	1.84	Light silty clay	A-6(11)	CL.
18	----------	35	19	16	13	1.82	Silt loam	A-6(10)	CL.
27	----------	35	20	15	20	1.66	Clay loam	A-6(10)	CL.
48	26	65	34	31	20	1.95	Light silty clay	A-7-5(20)	MH-CH.
56	34	67	37	30	8	1.96	Medium silty clay	A-7-5(20)	MH.
23	13	27	18	9	16.8	1.86	Silty clay loam	A-4(8)	CL.
19	12	29	20	9	18.8	1.84	Silt	A-4(8)	CL.
13	10	20	(2)	(2)	(3)	(3)	Silt loam	A-4(8)	ML.
39	24	36	14	22	18.8	1.85	Silty clay	A-6(13)	CL.
33	21	32	13	19	17.0	1.85	Light silty clay	A-6(12)	CL.

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[5] Trace.

[6] Concretions of calcium carbonate.

[7] The clay substratum was not sampled, but it commonly lies 40 to 48 inches below the surface.

[8] Concretions of ferromanganese.

TABLE 18.—*Estimated physical properties*

[All data are based on the mechanical analyses reported in table 17.

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Aa	Acadia complex, mounded, 0 to 3 percent slopes.	Low	D.	0 to 10	(100)	(98 to 100)	(85 to 90)	Moderately slow.
Ac	Acadia silt loam, 0 to 1 percent slopes.	Low	D.	14 to 24	(100)	(100)	(95 to 99)	Slow.
Ad	Acadia silt loam, 1 to 3 percent slopes.	Moderate	D.	30 to 40	(100)	(100)	(98 to 100)	Very slow.
Ae	Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes.	Low	D.					
Af	Amite fine sandy loam, 1 to 5 percent slopes.	Low	B.	0 to 12	(100)	(100)	(30 to 40)	Moderate.
Ag	Amite fine sandy loam, 1 to 5 percent slopes, eroded.	Low	B.	28 to 38	(100)	(100)	(65 to 75)	Moderate.
Ah	Amite fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	B.	60 to 70	(100)	(100)	(35 to 45)	Moderate.
Ak	Amite fine sandy loam, 8 to 20 percent slopes, eroded.	High	B.					
An	Amite soils, 5 to 20 percent slopes, severely eroded.	High	B.					
Am	Amite fine sandy loam, thick surface, 1 to 5 percent slopes.	Low	B.	0 to 20	(100)	(100)	(25 to 35)	Moderate to rapid.
				24 to 36	(100)	(100)	(65 to 75)	Moderate.
				36 to 48	(100)	(100)	(35 to 45)	Moderate.
Bb	Bibb silt loam	Low	D.	0 to 20	(100)	(98 to 100)	(65 to 75)	Moderately slow.
Bc	Bibb, Myatt, and Stough silt loams, overflow.	Low	D.	20 to 40	(100)	(99 to 100)	(75 to 90)	Moderately slow to slow.
Bd	Boswell fine sandy loam, 1 to 5 percent slopes, eroded.	Moderate	D.	0 to 6	100	85 to 99	30 to 40	Moderate.
Be	Boswell fine sandy loam, 5 to 8 percent slopes, eroded.	High	D.	6 to 16	100	99 to 100	85 to 95	Slow to very slow.
Bf	Boswell fine sandy loam, 8 to 20 percent slopes, eroded.	Very high	D.	36 to 48	100	99 to 100	85 to 95	Very slow.
Bg	Boswell sandy clay, 5 to 8 percent slopes, severely eroded.	Very high	D.					
Bh	Buxin clay, 0 to 1 percent slopes	Low	D.	0 to 18	(100)	(100)	(98 to 100)	Very slow.
Bk	Buxin clay, 1 to 3 percent slopes	Moderate	D.	24 to 40	(100)	(100)	(98 to 100)	Very slow.
Bm	Buxin clay, undulating	Moderate	D.					
Bn	Buxin complex, 0 to 3 percent slopes	Low	D.	0 to 12	(100)	(100)	(98 to 100)	Very slow.

See footnotes at end of table.

significant in engineering

Figures in parentheses were estimated, using test data from similar soils]

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate [4]	Shrink-swell potential [5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1. 4	5.0 to 6.0	High	Low	Silt loam	(ML)	A-4.	Acadia—6 inches to 1 foot of sandy silt over 2½ to 3 feet of silty clay or clay. Mounds are sandy and range from 1 to 3 feet in height. Somewhat poorly drained. Formed on stream terraces from clayey old alluvium.
1. 6	4.5 to 5.5	Low	High	Silty clay	(CL-CH)	A-6 or A-7.	
1. 6	4.5 to 5.5	Low	High	Clay	(CH)	A-7.	
							Wrightsville—6 to 18 inches of sandy silt over several feet of clay or silty clay. May have sandy or silty strata at a depth of more than 6 feet. Poorly drained.
1. 3	6.0 to 6.5	High	Low	Fine sandy loam.	SM	A-2 or A-4.	1 foot of silty sand over 1 foot of sandy clay over 1 foot of clayey sand over several feet of silty sand. Well drained. On stream terraces.
1. 8	5.0 to 6.0	Moderate	Moderate	Clay loam	CL-ML	A-4 or A-6.	
1. 6	4.5 to 5.5	Moderate	Low	Sandy clay loam.	SC	A-2 or A-4.	
1. 3	6.0 to 6.5	High	Low	Sandy loam	SM	A-2.	1½ to 2½ feet of silty sand over 1 foot of sandy clay over 1 foot of clayey sand over several feet of silty sand. Well drained. On stream terraces.
1. 8	5.0 to 6.0	Moderate	Moderate	Clay loam	CL-ML	A-4 or A-6.	
1. 6	4.5 to 5.5	Moderate	Low	Sandy clay loam.	SC	A-4.	
1. 7	5.0 to 5.5	High	Low	Silt loam	(ML)	A-4.	1 foot of sandy silt over sandy silt or clayey sand. Poorly drained. Frequent floods that may last several days. High water table at a depth of less than 3 feet during wet seasons. Formed from stratified alluvium on flood plains of local streams.
1. 6	5.0 to 5.5	High	Moderate	Silty clay loam.	(ML-CL)	A-4 or A-6.	
1. 5	5.0 to 6.0	High	Low	Fine sandy loam.	SM	A-4.	6 inches of silty sand over 1 to 1½ feet of silty clay to highly plastic clay over 2 or more feet of highly plastic clay. In sandy clay loam type (Bg), surface layer consists partly of original subsoil.
1. 6	4.5 to 5.5	Low	High	Clay	CH	A-7.	
1. 6	4.5 to 5.5	Moderate	High	Clay	CH	A-7.	
2. 5	6.5 to 7.5	Low	Very high	Clay	CH	A-7.	2 feet of fat clay over 3 feet of silty clay or fat clay. In places, sandy or silty strata at a depth of 5 feet or more. Formed from Red River alluvium.
2. 8	7.5 to 8.0	Low	Very high	Clay	CH	A-7.	
2. 5	6.5 to 7.5	Low	Very high	Silty clay to clay.	CH-MH to CH.	A-7.	On the ridges, 1 foot of fat clay over 1 foot of sandy silt over

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Bo	Buxin complex, overflow, 0 to 3 percent slopes.	Low	D.	16 to 24	(98 to 100) or (100).	(85 to 95) or (100).	(38 to 40) or (98 to 100).	Moderate or very slow.
				24 to 40	(100)	(98 to 100) or (100).	(70 to 85) or (98 to 100).	Moderately slow or very slow.
Bu	Buxin silty clay loam, 0 to 1 percent slopes.	Low	D.	0 to 18	(100)	(100)	(95 to 99)	Slow
				24 to 36	(100)	(100)	(98 to 100)	Slow to very slow.
Ca	Cahaba fine sandy loam, 1 to 5 percent slopes.	Low	B.	0 to 10	100	99 to 100	30 to 60	Moderate
Cb	Cahaba fine sandy loam, 1 to 5 percent slopes, eroded.	Low	B.	16 to 30	100	100	45 to 65	Moderate
Cc	Cahaba fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	B.	32 to 42	100	100	30 to 60	Moderate
Ct	Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes.	Low	B.					
Cd	Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded.	Low to moderate.	B.	0 to 18	(100)	(99 to 100)	(30 to 40)	Moderate
Cf	Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes.	Low to moderate.	B.	22 to 36	(100)	(100)	(35 to 45)	Moderate
				36 to 54	(100)	(100)	(30 to 40)	Moderate to rapid.
Cy	Chastain clay	Low	D.	0 to 48	(100)	(100)	(99 to 100)	Very slow
Ga	Gallion clay, overwash, 0 to 1 percent slopes.	Low	C.	0 to 12	(100)	(100)	(95 to 99)	Very slow
Gb	Gallion clay, overwash, 1 to 3 percent slopes.	Moderate	C.	15 to 36	(100)	(100)	(90 to 99)	Slow to moderately slow.
Gc	Gallion clay, overwash, undulating.	Moderate	C.					
Gk	Gallion silty clay loam, 0 to 1 percent slopes.	Low	C.					
Gd	Gallion silt loam, 0 to 1 percent slopes	Low	B.	0 to 12	100	100	95 to 99	Moderately slow.
Gg	Gallion silt loam, 1 to 3 percent slopes.	Moderate	B.	15 to 26	100	100	97 to 99	Moderately slow to moderate.
Gh	Gallion silt loam, 3 to 5 percent slopes.	Moderate	B.	39 to 46	100	100	95 to 99	Moderate
Gm	Gallion soils, mounded, 0 to 1 percent slopes.	Low	C.	----------	----------	----------	----------	----------

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate[4]	Shrink-swell potential [5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1. 4 or 2. 5	6.0 to 8.0	High to low	Low to high	Sandy loam or clay.	SM or CH	A–4 or A–7.	2 feet of clayey sand. In the depressions, 4 feet of fat clay over several feet of sandy silt. Water table at a depth of 2 to 3 feet in wet seasons. Formed from Red River alluvium over Coastal Plain alluvium.
1. 6 or 2. 8	6.0 to 7.5	High to low	Low to high	Sandy clay loam or clay.	CL–ML or CH.	A–4 or A–7.	
2. 0	7.0 to 7.5	High	Moderate to high.	Silty clay loam.	CL	A–4 or A–6.	1½ to 2 feet of silty clay over 2 feet of clay. Strata of silty clay and sandy silt in places at a depth of 4 feet or more. Formed from Red River alluvium.
2. 8	7.5 to 8.0	Low	High to very high.	Silty clay to clay.	CH or CL	A–7.	
1.3	6.0 to 6.5	Moderate to high.	Low	Fine sandy loam.	SM or ML	A–4.	6 inches to 1½ feet of silty fine sand over 1 to 1½ feet of clayey or silty fine sand over several feet of silty sand. Well drained. On stream terraces.
1.8	5.5 to 6.0	Moderate	Low	Loam or sandy clay loam.	SC or CL	A–4.	
1.6	5.5 to 6.0	Moderate to high.	Low	Fine sandy loam.	SM or ML	A–4.	
1.6	6.0 to 6.5	High	Low	Very fine sandy loam.	SM	A–2 or A–4.	1½ feet of silty sand over 1½ feet of clayey sand over 1½ feet of silty sand. Well drained. Water table at a depth of more than 6 feet. On stream terraces.
1.8	5.5 to 6.0	Moderate to high.	Low	Sandy clay loam.	SM–SC	A–4.	
1.6	5.5 to 6.0	High	Low	Sandy loam	SM	A–2 or A–4.	
2.5	4.5 to 5.5	Low	High	Clay	CH–MH	A–7.	4 to 5 feet of silty clay or fat clay over sandy silt or silty sand. Water table at a depth of less than 3 feet. Annual floods that last several weeks. On the flood plains of Bodcau Bayou and Lower Cypress Bayou.
2.5	7.0 to 7.5	Low	High	Silty clay to clay.	CL–CH	A–6 or A–7.	6 inches to 1½ feet of silty clay or fat clay over 3 feet of silty clay to silty sand. Well drained. Formed from Red River alluvium.
2.0	6.0 to 7.0	High	Moderate	Silty clay loam to silt loam.	CL–ML	A–6 or A–4.	
1.8	6.0 to 7.0	High	Low	Silt loam	ML	A–4.	1 foot of silty fine sand over 1 foot of silty clay over 2 feet of silty fine sand. Well drained. Formed from Red River alluvium.
2.2	6.0 to 6.5	Moderate	Moderate	Silt clay loam.	CL–ML	A–6.	
2.2	6.0 to 7.0	High	Moderate	Silt loam	CL–ML or ML.	A–4.	
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TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydro-logic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Go	Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded.	High to very high.	D.	0 to 6	(100)	(98 to 100)	(60 to 70)	Moderate
				6 to 54	(100)	(100)	(90 to 95)	Very slow
Gr	Gore very fine sandy loam, 1 to 5 percent slopes.	Moderate	D.					
Gs	Gore very fine sandy loam, 1 to 5 percent slopes, eroded.	Moderate	D.					
Gv	Gore very fine sandy loam, 5 to 16 percent slopes, eroded.	High to very high.	D.					
Ha	Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes.	Low	B.	0 to 24	(100)	(99 to 100)	(30 to 40)	Moderate
				46 to 60	(100)	(80 to 90)	(65 to 75)	Slow to moderately slow.
Hn	Hortman very fine sandy loam, 1 to 5 percent slopes, eroded.	Moderate	C.	0 to 6	(100)	(98 to 100)	(50 to 65)	Moderate
Hr	Hortman very fine sandy loam, 5 to 8 percent slopes, eroded.	High	C.	6 to 48	(100)	(100)	(90 to 95)	Very slow
Hs	Huckabee loamy fine sand, 1 to 5 percent slopes.	Moderate	A.	0 to 60	(100)	(100)	(20 to 30)	Rapid
Hu	Huckabee loamy fine sand, 5 to 20 percent slopes.	High	A.					
In	Independence loamy fine sand, 0 to 1 percent slopes.	Low	A.	0 to 48	(100)	(100)	(20 to 30)	Rapid
Ka	Kalmia very fine sandy loam, 0 to 1 percent slopes.	Low	B.	0 to 18	(100)	(100)	(45 to 55)	Moderate
				18 to 36	(100)	(100)	(35 to 45)	Moderate
				36 to 54	(100)	(100)	(30 to 40)	Moderate to rapid.
Kr	Kirvin fine sandy loam, 1 to 5 percent slopes, eroded.	Low	C.	0 to 12	(100)	(100)	(37 to 47)	Moderate to rapid.
Ks	Kirvin fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	C.	14 to 36	(100)	(100)	(60 to 75)	Moderately slow.
Kt	Kirvin fine sandy loam, 8 to 30 percent slopes.	High	C.					
Ku	Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded.	High	C.					
Kv	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes.	Low	C.	0 to 12	(60 to 80)	(60 to 80)	(15 to 25)	Rapid
Kw	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded.	Low	C.	14 to 33	(96 to 99)	(85 to 95)	(60 to 75)	Moderately slow.
Kx	Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	C.					
Ky	Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded.	High to very high	C.					

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate [4]	Shrink-swell potential [5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1.5	5.0 to 5.5	High	Low	Very fine sandy loam.	ML	A-4.	4 to 4½ feet of fat clay over several feet of stratified fat clay and silty fine sand. On stream terraces.
1.6	4.5 to 5.0	Low	High	Clay	CH	A-7.	
1.6	6.0 to 6.5	High	Low	Fine sandy loam to loam.	SM	A-2 or A-4.	3 to 4 feet of well-drained silty sand over 2 feet of poorly drained silty fine sand. Water table at a depth of about 4 feet in wet seasons.
1.4	4.5 to 5.0	High	Low	Silt loam	ML-CL	A-4 or A-6.	
1.5	5.5 to 6.0	High	Low	Very fine sandy loam.	ML	A-4.	3½ to 4 feet of fat clay over stratified fat clay and sandy silt. Well drained. On stream terraces.
1.6	4.5 to 5.5	Low	High	Clay	CH	A-7.	
1.0	6.0 to 6.5	High to very high.	Low	Loamy fine sand.	SM or SP	A-2 or A-3.	5 to 6 feet of poorly graded fine sand over stratified silty sand and clayey sand. Well drained. Water table at a depth of more than 6 feet. On stream terraces.
1.0	6.0 to 6.5	High to very high.	Low	Loamy fine sand.	SM or SP	A-2 or A-3.	5 to 6 feet of poorly graded fine sand over stratified silty sand and clayey sand. Well drained. Water table at a depth of more than 6 feet. On stream terraces.
1.5	5.5 to 6.0	High	Low	Very fine sandy loam.	SM-ML	A-4.	1½ feet of silty sand over 1½ feet of clayey sand over 1½ feet of silty sand. Well drained. Water table at a depth of more than 6 feet. On stream terraces.
1.6	5.0 to 6.0	Moderate	Low	Sandy clay loam.	SC	A-4.	
1.4	5.0 to 5.5	High	Low	Sandy loam	SM	A-2 or A-4.	
1.5	5.5 to 6.5	Moderate	Low	Fine sandy loam.	SM	A-4.	1 to 1½ feet of silty fine sand over 2 to 2½ feet of sandy clay. Severely eroded soil (Ku) has no sandy silt surface layer. Well drained. On uplands.
1.8	5.0 to 5.5	Low	Moderate	Sandy clay to clay loam.	CL or CL-ML.	A-6.	
0.7	5.0 to 6.5	Low	Low	Gravelly fine sandy loam.	SM	A-2.	1 foot of gravelly silty fine sand over 2 feet of sandy clay that contains fragments of ironstone. Thin layers of ironstone rock at various depths. Well drained. On uplands.
1.8	5.0 to 5.5	Low	Moderate	Sandy clay to clay loam.	CL to CL-ML.	A-6.	

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
La	Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes.	Moderate	A.	*Inches* 0 to 48	100	100	15 to 25	Rapid to very rapid.
Lb	Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes.	High	A.					
Lc	Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes.	Very high	A.					
Ld	Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded.	High to very high.	A.					
Lf	Luverne fine sandy loam, 1 to 5 percent slopes, eroded.	Low	B.	0 to 12	100	100	45 to 55	Moderate to rapid.
Lg	Luverne fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	B.	18 to 40	100	100	55 to 65	Moderately slow to moderate.
Lh	Luverne fine sandy loam, 8 to 20 percent slopes, eroded.	High to very high.	B.					
Lk	Luverne gravelly fine sandy loam, 1 to 5 percent slopes.	Low	B.	0 to 18	(55 to 70)	(55 to 70)	(15 to 30)	Very rapid
Lm	Luverne gravelly fine sandy loam, 5 to 8 percent slopes.	Moderate	B.	20 to 40	(98 to 100)	(90 to 95)	(60 to 70)	Moderately slow to moderate.
Ln	Luverne loamy fine sand, thick surface, 1 to 5 percent slopes.	Low	B.	0 to 24	100	100	20 to 25	Rapid
Lo	Luverne loamy fine sand, thick surface, 5 to 8 percent slopes.	Moderate	B.	28 to 40	100	100	35 to 45	Moderately slow to moderate.
				48 to 60	100	100	25 to 35	Moderate to rapid.
Lp	Luverne soils, 1 to 20 percent slopes, severely eroded.	Moderate to very high.	C.	0 to 36	(100)	(100)	(40 to 65)	Moderately slow to moderate.
Ma	Mantachie very fine sandy loam	Low	C.	0 to 12	(100)	(100)	(60 to 70)	Moderate
				12 to 30	(100)	(100)	(65 to 75)	Moderately slow.
Mb	McKamie very fine sandy loam, 1 to 5 percent slopes.	Moderate	C.	0 to 6	(100)	(100)	(35 to 55)	Moderate
Mc	McKamie very fine sandy loam, 1 to 5 percent slopes, eroded.	Moderate	C.	12 to 30	(100)	(100)	(85 to 95)	Very slow
Md	McKamie very fine sandy loam, 5 to 8 percent slopes, eroded.	High	C.					
Me	McKamie and Hortman soils, 8 to 20 percent slopes.	Very high	C.					
Mg	Miller clay, 0 to 1 percent slopes	Low	D.	0 to 12	100	100	96 to 100	Very slow
Mh	Miller clay, 1 to 3 percent slopes	Moderate	D.	18 to 40	100	100	96 to 100	Very slow
Mk	Miller clay, 3 to 8 percent slopes	High	D.					
Mm	Miller clay, overflow, 0 to 1 percent slopes.	Low	D.					
Mn	Miller clay, undulating	Moderate	D.					

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate [4]	Shrink-swell potential [5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1.0	5.5 to 6.0	High	Low	Loamy fine sand.	SM	A-2.	4 to 6 feet of poorly graded fine sand over sandy clay or clayey sand. Well drained. On uplands.
1.3	5.5 to 6.0	High	Low	Fine sandy loam.	SM-ML	A-4.	1 foot of silty sand over 3 to 4 feet of sandy clay to clayey fine sand. Well drained. On uplands.
1.8	4.5 to 5.5	Moderate	Moderate	Sandy clay	CL or CL-ML.	A-6.	
0.5	6.0 to 6.5	Low	Low	Gravelly sandy loam.	SM	A-2.	1½ feet of gravelly silty sand over 3 to 4 feet of sandy clay to clayey fine sand. Well drained. On uplands.
1.8	4.5 to 5.5	Moderate	Moderate	Sandy clay to sandy clay loam.	CL or CL-ML.	A-4.	
1.0	5.5 to 6.0	High	Low	Loamy fine sand.	SM	A-2.	1½ to 2½ feet of silty sand over 1 to 1½ feet of clayey sand to silty sand over 1½ to 3 feet of clayey sand. Well drained On uplands.
1.8	4.5 to 5.5	Moderate	Moderate to low.	Sandy clay	SC	A-4.	
1.6	4.5 to 5.5	Moderate to high.	Low	Sandy clay loam to sandy loam.	SM-SC	A-2 or A-4.	
1.6 to 1.8	4.5 to 5.5	Moderate	Moderate to low.	Sandy clay or sandy clay loam.	CL or SC	A-4.	6 inches or less of silty sand over 1 to 1½ feet of clayey sand. In gullied areas, the surface layer is sandy clay to clayey sand.
1.7	5.5 to 6.0	High	Low	Very fine sandy loam.	ML	A-4.	1 foot of sandy silt over sandy silt or clayey sand. Frequent floods, usually of short duration. Water table at a depth of 3 to 4 feet in wet seasons. Formed from stratified alluvium. On flood plains of local streams.
1.8	5.0 to 5.5	High	Low to moderate.	Silt loam to silty clay loam.	ML or CL-ML.	A-4.	
1.5	5.5 to 6.5	Low	Low	Very fine sandy loam.	SM or ML	A-4.	6 inches to 1 foot of silty sand over 2 to 2½ feet of fat clay over stratified sandy silt, silty clay, and clayey sand. Well drained. On stream terraces.
1.6	4.5 to 5.5	Low	High	Clay	CH	A-7.	
2.5	7.5 to 8.0	Low	Very high	Clay	CH	A-7.	4 feet or more of fat clay. Overflow phase (Mm) flooded for long periods every year. Formed from Red River alluvium.
2.8	7.5 to 8.0	Low	Very high	Clay	CH	A-7.	

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Mo	Miller silt loam, 0 to 1 percent slopes.	Low	C.	0 to 12	(100)	(98 to 100)	(80 to 95)	Moderately slow to moderate.
Mp	Miller silt loam, 1 to 3 percent slopes.	Moderate	C.	12 to 36	(100)	(100)	(96 to 100)	Very slow
Mr	Miller silty clay loam, 0 to 1 percent slopes.	Low	C.	0 to 10	100	100	97 to 100	Slow
				12 to 36	100	100	96 to 100	Very slow
Mt	Mixed wet alluvial land	Low	D.	0 to 18	(100)	(100)	(45 to 60)	Moderate
				18 to 30	(100)	(100)	(50 to 70)	Moderately slow to moderate.
Ms	Mixed alluvial land	Low	B.	0 to 24	(100)	(100)	(45 to 60)	Moderate to rapid.
				24 to 36	(100)	(100)	(40 to 50)	Moderate
Mu	Morse clay, 1 to 5 percent slopes, eroded.	Moderate	D.	0 to 40	100	98 to 100	90 to 98	Very slow
Mv	Morse clay, 5 to 8 percent slopes, eroded.	High	D.					
Mw	Morse clay, 8 to 20 percent slopes, eroded.	Very high	D.					
Mx	Morse clay, 3 to 8 percent slopes, severely eroded.	High	D.					
My	Morse clay, dark surface, 1 to 5 percent slopes.	High	D.					
Mz	Morse clay, dark surface, 1 to 5 percent slopes, eroded.	High	D.					
Maa	Muskogee complex, mounded, 1 to 3 percent slopes.	Moderate	C.	0 to 12	(100)	(99 to 100)	(75 to 85)	Moderately slow to moderate.
Mab	Muskogee silt loam, 1 to 5 percent slopes.	Moderate	C.	16 to 24	100	100	98 to 100	Slow
Mac	Muskogee silt loam, 1 to 5 percent slopes, eroded.	Moderate	C.	30 to 40	(100)	(100)	(98 to 100)	Very slow
Mad	Muskogee soils, 1 to 8 percent slopes, severely eroded.	Moderate to high.	C.					
Mae	Myatt complex, mounded	Low	D.	0 to 12	(100)	(99 to 100)	(75 to 85)	Moderately slow to moderate.
Maf	Myatt silt loam	Low	D.					
Mag	Myatt-Stough complex, overflow.	Low	D.	12 to 30	(100)	(99 to 100)	(75 to 85)	Slow to very slow.

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate [4]	Shrink-swell potential [5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1.8	7.5 to 8.0	High	Low	Silt loam	ML	A-4.	1 foot of silt over 2 to 2½ feet of fat clay. In places, thin strata of silt to silty clay below a depth of 3½ feet.
2.8	7.5 to 8.0	Low	Very high	Clay	CH	A-7.	
2.2	7.5 to 8.0	Low	High	Silty clay loam.	CL	A-6.	1 to 1½ feet of silty clay over 2 feet of fat clay. In places, thin strata of silt to silty clay below a depth of 3½ feet.
2.8	7.5 to 8.0	Low	Very high	Clay	CH	A-7.	
1.5	5.0 to 6.0	High	Low	Silt loam to fine sandy loam.	SM or ML	A-4.	1½ feet of silty sand over stratified sandy silt or clayey sand. Poorly drained. Frequent floods, usually of short duration. On flood plains of local streams.
1.8	4.5 to 5.5	High	Low to moderate.	Silt loam to sandy clay loam.	ML to SC	A-4.	
1.5	5.0 to 6.0	High	Low	Sandy loam	SM or ML	A-4.	2 feet of silty sand over stratified sandy, silty, or clayey sand. Well drained. On flood plains of local streams.
1.6	5.0 to 6.0	High	Low	Sandy loam to sandy clay loam.	SC	A-4.	
1.5	7.5 to 8.5	Low	Very high	Clay	CH	A-7.	4 to 6 feet or more of fat clay. Below this depth, may be stratified with thin layers of silty sand. On stream terraces.
1.5	5.5 to 6.0	High	Low	Silt loam	ML	A-4.	1 foot of sandy silt over 1½ feet of silty clay over several feet of silty clay to fat clay. Severely eroded phase (Mad) has 2 to 2½ feet of silty clay or fat clay. Mounds are silty sand and range from 1 to 3 feet in height. On stream terraces.
1.6	5.0 to 6.0	Low	Moderate	Silty clay loam.	MH	A-6.	
1.6	5.0 to 6.0	Low	High	Silty clay or clay.	CH-MH	A-7.	
1.5	5.0 to 6.0	High	Low	Silt loam	ML	A-4.	1 foot of sandy silt over 2 feet of silt to silty clay. Mounds are silty sand and range from 1 to 3 feet in height. Poorly drained. Overflow phase (Mag) flooded 1 to 3 times a year for short periods. Water table at a depth of less than 3 feet in wet seasons. On stream terraces.
1.6	4.5 to 5.5	High to very high.	Low to moderate.	Silt loam to silty clay loam.	ML-CL	A-6.	

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Na	Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded.	Low	C.	0 to 12	(60 to 80)	(60 to 80)	(15 to 25)	Rapid
Nc	Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	C.	20 to 36	(90 to 95)	(96 to 99)	(60 to 70)	Moderate
Ng	Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded.	High to very high.	C.	36 to 100	(99 to 100)	(99 to 100)	(40 to 50)	Moderate
Ns	Nacogdoches soils, 5 to 30 percent slopes, severely eroded.	Very high	C.					
Oc	Ochlockonee and Iuka sandy loams.	Low	B and C.	0 to 18	(100)	(100)	(60 to 70)	Moderate
				18 to 36	(100)	(100)	(65 to 75)	Moderate
Of	Orangeburg fine sandy loam, 1 to 5 percent slopes.	Low	B.	0 to 12	(99 to 100)	(98 to 100)	(35 to 45)	Moderate to rapid.
Og	Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded.	Low	B.	19 to 40	(100)	(100)	(40 to 50)	Moderate
Om	Orangeburg fine sandy loam, 5 to 8 percent slopes.	Moderate	B.	40 to 70	(100)	(100)	(40 to 50)	Moderate
Or	Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	B.					
Ou	Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded.	High	B.					
Pa	Perry clay	Low	D.	0 to 50	(100)	(100)	(95 to 100)	Very slow
Pb	Perry clay, overflow	Low	D.					
Pe	Perry soils, overflow	Low	D.					
Ph	Pheba complex, mounded, 0 to 3 percent slopes.	Low	C.	0 to 7	(100)	(98 to 100)	(40 to 60)	Moderate
Pk	Pheba very fine sandy loam, 0 to 3 percent slopes.	Low	C.	14 to 22	(100)	(99 to 100)	(55 to 65)	Slow
				34 to 60	(100)	(99 to 100)	(50 to 65)	Slow to moderately slow.
Po	Prentiss very fine sandy loam, 0 to 1 percent slopes.	Low	C.	0 to 12	(100)	(90 to 100)	(55 to 65)	Moderate
Pv	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes.	Low	C.	26 to 32	(100)	(98 to 100)	(60 to 75)	Moderately slow.
Pw	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded.	Moderate	C.	46 to 52	(100)	(100)	(60 to 70)	Moderate

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate [4]	Shrink-swell potential [5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
0.7	6.0 to 6.5	Low	Low	Gravelly fine sandy loam.	SM	A-2.	1 foot of gravelly silty fine sand over 2 feet of sandy clay or clayey fine sand over several feet of clayey fine sand. Thin layers of ironstone at various depths. Well drained. On uplands.
1.8	5.5 to 6.5	Low	Low	Clay loam to sandy clay loam.	CL or CL-ML.	A-4.	
1.6	5.5 to 6.5	Low	Low	Sandy clay loam.	SC	A-4.	
1.7	5.5 to 6.0	High	Low	Sandy loam	ML	A-4.	1½ feet of silty fine sand over 1½ feet of sandy or silty clay loam. Well drained. Formed from stratified local alluvium.
1.8	5.0 to 5.5	High	Low	Silt loam to silty clay loam.	ML to CL-ML.	A-4.	
1.3	6.0 to 6.5	Moderate to high.	Low	Fine sandy loam.	SM	A-4.	6 inches to 1 foot of silty sand over 1½ to 2 feet of silty sand to clayey sand over several feet of silty sand. Well drained. On uplands.
1.6	5.5 to 6.0	Moderate	Low	Sandy clay loam.	SM-SC	A-4.	
1.6	4.5 to 5.5	Moderate	Low	Fine sandy loam.	SC	A-4.	
2.5	6.0 to 8.0	Low	High to very high.	Clay	CH	A-7.	4 to 5 feet of fat clay. In places, strata of sandy silt or silty clay, 1 to 2 feet thick, at a depth of more than 5 feet. Poorly drained. Formed from Red River alluvium.
1.5	5.0 to 5.5	Moderate	Low	Very fine sandy loam.	SM or ML	A-4.	6 inches to 1 foot of sandy silt or silty sand over 2 feet of clayey fine sand to sandy clay over 2 feet of sandy silt. Poorly drained. On uplands.
1.6	4.5 to 5.5	High	Low to moderate.	Sandy clay loam.	CL-ML	A-4 or A-6.	
1.4	4.5 to 5.0	High	Low to moderate.	Silt loam	CL-ML	A-4.	
1.5	5.0 to 5.5	Moderate	Low	Very fine sandy loam.	ML	A-4.	6 inches to 1 foot of sandy silt over 2 to 3 feet of sandy clay to clayey fine sand or clayey silt. In places, strata of silty sand at a depth of more than 3 feet. Well drained. On stream terraces.
1.6	4.5 to 5.5	Moderate	Low	Sandy or silty clay loam.	CL-ML	A-4.	
1.4	4.5 to 5.5	High	Low	Fine sandy loam to silt loam.	ML	A-4.	

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Pm	Prentiss complex, mounded, 0 to 1 percent slopes.	Low	C.	0 to 12	(100)	(100)	(60 to 90)	Moderately slow.
Pn	Prentiss complex, mounded, 1 to 5 percent slopes.	Moderate	C.	12 to 26	(100)	(100)	(75 to 90)	Moderately slow to slow.
Pp	Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes.	Low	C.	36 to 44	(100)	(100)	(75 to 95)	Moderately slow to slow.
Pr	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes.	Moderate	C.					
Ps	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded.	Moderate	C.					
Pt	Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes.	Low	C.					
Ra	Riverwash	Variable			No predictable arrangement of layers, particle size, or			
Rb	Roebuck clay, 0 to 1 percent slopes.	Low	D.	0 to 4	(100)	(100)	(98 to 100)	Slow to very slow.
Rc	Roebuck clay, 1 to 3 percent slopes.	Low	D.	4 to 24	(100)	(100)	(98 to 100)	Very slow
Rd	Roebuck clay, overflow, 0 to 1 percent slopes.	Low	D.	24 to 42	(100)	(100)	(98 to 100)	Very slow
Re	Roebuck clay, undulating	Low	D.					
Rf	Roebuck silt loam, 0 to 1 percent slopes.	Low	C.	0 to 6	(100)	(100)	(99 to 100)	Moderately slow.
				6 to 24	(100)	(98 to 100)	(99 to 100)	Slow
				24 to 42	(100)	(100)	(100)	Very slow
Rg	Ruston fine sandy loam, 1 to 5 percent slopes.	Low	B.	0 to 12	100	100	35 to 45	Moderate to rapid.
Rh	Ruston fine sandy loam, 1 to 5 percent slopes, eroded.	Low	B.	16 to 28	100	100	40 to 50	Moderate
Rk	Ruston fine sandy loam, 5 to 8 percent slopes.	Moderate	B.	30 to 42	100	100	35 to 45	Moderate
Rm	Ruston fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	B.					
Ru	Ruston soils, 1 to 8 percent slopes, severely eroded.	High	B.					
Rn	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes.	Moderate	C.	0 to 10	95 to 100	90 to 100	40 to 60	Moderate
				10 to 24	90 to 100	90 to 100	60 to 70	Moderately slow.
Ro	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded.	Moderate	C.	28 to 42	85 to 100	88 to 98	45 to 70	Moderately slow.
Rs	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes.	High	C.					
Rt	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes, eroded.	High	C.					

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity[3]	Reaction	Dispersion rate[4]	Shrink-swell potential[5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1.5	5.0 to 5.5	Moderate to high.	Low	Silt loam	ML	A-4.	6 inches to 1 foot of sandy silt over 2 to 3 feet of sandy clay, clayey fine sand, or clayey silt. In places, strata of fat clay 1 to 2 feet thick at a depth of about 4½ feet. Mounds are silty and range from 1 to 3 feet in height. Well drained to somewhat poorly drained.
1.8	4.5 to 5.5	Moderate to high.	Low	Silty clay loam.	CL-ML	A-4.	
1.8	4.5 to 5.5	Moderate to high.	Low	Silty clay	CL-MH	A-6.	
physical properties							6 inches to 1 foot of thinly stratified, poorly graded fine sand, silty sand, sandy silt, and silty clay. Annual, prolonged floods deposit new material. Formed from Red River alluvium.
2.5	7.0 to 7.5	Low	Very high	Clay	CH	A-7.	4 feet or more of fat clay. Overflow phase flooded annually for prolonged periods. Formed from Red River alluvium.
2.8	6.5 to 8.0	Low	Very high	Clay	CH	A-7.	
2.8	7.5 to 8.0	Low	Very high	Clay	CH	A-7.	
2.2	6.0 to 7.0	High	Low	Silt loam	ML	A-4.	6 inches of silt over 1½ feet of silty clay over 1½ feet of clay. Well drained. Formed from Red River alluvium.
2.8	7.0 to 7.5	Low	High	Silty clay	CL	A-6.	
2.8	7.5 to 8.0	Low	Very high	Clay	CH-CL	A-7.	
1.3	5.5 to 6.5	Moderate	Low	Fine sandy loam.	SM	A-4.	6 inches to 1 foot of silty sand over 1½ feet of clayey sand over 2 to 3 feet of silty sand. Well drained. On uplands.
1.8	5.0 to 6.0	Moderate	Low	Sandy clay loam.	SM-SC	A-4.	
1.6	5.0 to 5.5	Moderate	Low	Sandy loam	SM	A-4.	
1.6	5.5 to 6.0	Moderate	Low	Fine sandy loam.	SM or ML	A-4.	6 inches to 1 foot of silty sand over 1½ to 2 feet of sandy clay over 1 to 2 feet of sandy clay to clayey sand. Well drained. On uplands.
1.8	4.5 to 5.5	Moderate	Low to moderate.	Clay loam	CL-ML or CL.	A-4 or A-6.	
1.8	4.5 to 5.5	Moderate	Moderate to low.	Sandy clay loam.	SC to CL-ML.	A-4 or A-6.	

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Sa	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes.	Low	C and B.	0 to 7	100	98 to 100	40 to 60	Moderate to rapid.
Sb	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded.	Low	C and B.	1 to 18	100	98 to 100	65 to 75	Slow to moderate.
				36 to 46	100	98 to 100	45 to 75	Moderately slow to moderate.
Sc	Sawyer fine sandy loam, 1 to 5 percent slopes.	Moderate	C.	0 to 7	(100)	(99 to 100)	(40 to 50)	Moderate
Sd	Sawyer fine sandy loam, 1 to 5 percent slopes, eroded.	Moderate	C.	7 to 28	(100)	(99 to 100)	(55 to 70)	Moderately slow.
				28 to 46	(100)	(100)	(75 to 85)	Very slow
				46 to 55	(100)	(100)	(85 to 90)	Very slow
Se	Shubuta fine sandy loam, 1 to 5 percent slopes.	Moderate	C.	0 to 7	90 to 100	85 to 100	35 to 60	Moderate
Sf	Shubuta fine sandy loam, 1 to 5 percent slopes, eroded.	Moderate	C.	7 to 28	100	100	80 to 90	Slow
Sg	Shubuta fine sandy loam, 5 to 8 percent slopes.	High	C.	36 to 48	100	100	80 to 85	Slow
Sh	Shubuta fine sandy loam, 5 to 8 percent slopes, eroded.	High	C.					
Sk	Shubuta fine sandy loam, 8 to 16 percent slopes, eroded.	Very high	C.					
Sm	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes.	Low	C.	0 to 10	60 to 70	60 to 70	15 to 30	Moderate to rapid.
Sn	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded.	Low	C.	19 to 25	99 to 100	98 to 100	60 to 70	Slow
				30 to 40	98 to 100	98 to 100	40 to 50	Slow
So	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes.	Moderate	C.					
Sp	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded.	Moderate	C.					
Sr	Shubuta gravelly fine sandy loam, 8 to 20 percent slopes.	High	C.					
Ss	Shubuta soils, 5 to 30 percent slopes, severely eroded.	High to very high.	C.					
St	Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded.	High to very high.	C.					
Su	Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes.	High to very high.	C.					
Sw	Stough silt loam, 0 to 3 percent slopes.	Low	C.	0 to 20	100	100	80 to 85	Moderately slow.
				20 to 36	100	95 to 100	85 to 95	Slow
				36 to 46	100	85 to 95	85 to 95	Slow

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate [4]	Shrink-swell potential [5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1.3 to 1.5	5.5 to 6.0	Moderate to high.	Low	Very fine sandy loam.	SM or ML	A–4.	6 inches to 1 foot of sandy silt or silty sand over 2 to 3 feet of sandy clay to clayey fine sand. Well drained. On uplands.
1.5 to 1.8	5.0 to 5.5	Moderate to high.	Low to moderate.	Sandy clay loam.	CL–ML	A–4.	
1.4 to 1.6	4.5 to 5.0	Moderate to high.	Low	Loam, silt loam, or clay loam.	CL–ML or CL	A–4 or A–6.	
1.5	5.5 to 6.0	Moderate	Low	Fine sandy loam.	SM	A–4.	6 inches to 1 foot of silty sand or sandy silt over 1 foot of sandy clay over several feet of silty clay to fat clay. Well drained to somewhat poorly drained. Water table generally at a depth of more than 6 feet. On uplands.
1.6	5.0 to 5.5	Low	Moderate to high.	Sandy clay	CL	A–6.	
1.6	4.5 to 5.5	Moderate to high.	High	Silty clay or clay.	MH–CH	A–7.	
1.8	4.5 to 5.0	High	High	Clay	CH	A–7.	
1.6	5.5 to 6.0	Moderate	Low	Fine sandy loam.	SM or ML	A–2 or A–4.	6 inches to 1 foot of silty sand that contains some ironstone gravel over 3 to 4 feet or more of silty clay or clay of medium to high plasticity. Below a depth of 4 or 5 feet, there may be strata of clayey sand to sandy silt less than 6 inches thick. Well drained. On uplands.
1.8	5.0 to 5.5	Low	High	Clay to silty clay.	CH–MH	A–7.	
1.8	4.5 to 5.0	Low	High	Silty clay to clay.	CL–ML or CH–MH.	A–7.	
0.7 to 1.5	5.5 to 6.0	Low	Low	Gravelly fine sandy loam.	SM	A–2.	6 inches to 1 foot of gravelly silty sand over 2 feet of silty clay or clay over stratified sandy clay, clay, and clayey sand. The layer of silty clay or clay is 10 to 20 percent ironstone gravel and is of medium to high plasticity. The severely eroded soils (Ss) do not have the sandy surface layer. Well drained. On uplands.
1.8	5.0 to 5.5	Low	High	Clay	CH–CL	A–7.	
1.6	4.5 to 5.0	Low	Moderate to high.	Sandy clay	SC or CL	A–4 or A–6.	
1.5	5.0 to 5.5	High	Low	Silt loam	ML	A–4.	1½ feet or less of sandy silt over 2 feet of clayey silt to silty clay over 2 feet of sandy silt to clayey silt. Poorly drained. Water table at a depth of less than 3 feet in wet seasons. On stream terraces.
1.6	4.5 to 5.0	High	Low	Silty clay loam.	CL–ML	A–4.	
1.4	4.5 to 5.0	High	Low	Silt loam or silty clay loam.	ML or CL–ML.	A–4.	

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing— No. 10 sieve	Percentage passing— No. 40 sieve	Percentage passing— No. 200 sieve	Permeability [2]
				Inches				
Sv	Stough complex, mounded, 0 to 1 percent slopes.	Low	C.	0 to 12	100	100	85 to 95	Moderately slow.
Sx	Stough silt loam, clay substratum, 0 to 1 percent slopes.	Low	C.	12 to 36	100	95 to 100	85 to 90	Slow
Sy	Stough silt loam, clay substratum, 1 to 3 percent slopes.	Low	C.	36 to 48	100	99 to 100	85 to 95	Slow
Sz	Susquehanna fine sandy loam, 1 to 8 percent slopes.	Moderate to high.	D.	0 to 5	98 to 100	98 to 100	55 to 65	Moderately slow.
Saa	Susquehanna soils, 8 to 30 percent slopes, eroded.	Veryhigh	D.	22 to 34	(100)	(99 to 100)	(85 to 95)	Very slow
Sab	Susquehanna soils, 5 to 30 percent slopes, severely eroded.	Very high	D.					
Td	Tilden soils, 1 to 8 percent slopes, severely eroded.	High	C.	0 to 6	100	99 to 100	50 to 75	Moderate
Tf	Tilden very fine sandy loam, 0 to 1 percent slopes.	Low	C.	6 to 25	100	99 to 100	75 to 90	Moderately slow.
Ts	Tilden very fine sandy loam, 1 to 5 percent slopes.	Low	C.	44 to 54	100	100	75 to 85	Very slow
Tv	Tilden very fine sandy loam, 1 to 5 percent slopes, eroded.	Moderate	C.					
Va	Vaucluse loamy fine sand, 1 to 5 percent slopes.	Moderate	C.	0 to 18	(100)	(98 to 100)	(20 to 30)	Rapid
Vc	Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded.	Moderate	C.	21 to 31	(100)	(99 to 100)	(45 to 60)	Moderately slow to moderate.
Vf	Vaucluse loamy fine sand, 5 to 8 percent slopes.	High	C.	31 to 42	(100)	(99 to 100)	(40 to 50)	Moderate
Vm	Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded.	High	C.					
Vs	Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded.	Very high	C.					
Wr	Wrightsville complex, mounded	Low	D.	0 to 8	100	100	70 to 80	Moderately slow.
Wt	Wrightsville silt loam	Low	D.	10 to 18	100	100	85 to 95	Slow
				18 to 36	100	100	90 to 99	Very slow
Wv	Wrightsville silty clay	Low	D.	0 to 7	100	100	96 to 98	Slow
				9 to 26	100	100	95 to 98	Very slow
				28 to 36	100	100	95 to 98	Very slow

See footnotes at end of table.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate[4]	Shrink-swell potential[5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
1.5	5.0 to 5.5	High to very high.	Low	Silt loam	ML	A–4.	1 foot of silt over 2 feet of silty clay to silt over 1 foot or more of silty clay or clay. Mounds are silty sand and range from 1 to 3 feet in height. Poorly drained. Water table at a depth of 4 feet in wet seasons.
1.5	4.5 to 5.0	High to very high.	Low	Silty clay loam to silt loam.	CL–ML	A–4.	
1.4	4.5 to 5.0	High to very high.	Low	Silt loam	CL–ML	A–4.	
1.5	5.5 to 6.0	Moderate	Low	Fine sandy loam.	ML	A–4.	6 inches or less of silty sand over 3 to 5 feet of clay of high plasticity. On uplands.
1.8	4.5 to 5.5	Moderate to high.	High	Clay	CH	A–7.	
1.5	5.5 to 6.0	Moderate to high.	Low	Very fine sandy loam.	ML	A–4.	6 inches to 1 foot of sandy silt over 2 to 3 feet of sandy clay to clayey fine sand or clayey silt. In places, strata of fat clay or silty clay, 1 to 2 feet thick, at a depth of about 4½ to 5 feet. Well drained. On stream terraces.
1.8	4.5 to 5.5	Moderate	Low	Silty clay loam or clay loam.	CL–ML	A–4 or A–6.	
2.5	4.0 to 5.0	Low	High	Silty clay	CL	A–6.	
1.0	5.5 to 6.0	High	Low	Loamy fine sand.	SM	A–2.	1 to 2½ feet of silty sand over 1 to 2 feet of sandy clay over 2 to 3 feet of clayey sand. Well drained. On uplands.
1.5	5.0 to 5.5	Moderate	Low	Sandy clay loam.	SC or CL	A–6.	
1.3	5.0 to 5.5	Moderate to high.	Low	Sandy loam to sandy clay loam.	SM–SC	A–4.	
1.5	5.0 to 5.5	High	Low	Silt loam	ML	A–4.	6 inches to 1½ feet of silt over 3 to 4 feet of silty clay or clay of high plasticity. Mounds are 1 to 2 feet of silty fine sand over several feet of silty clay or clay of high plasticity. Poorly drained. On stream terraces.
1.6	4.5 to 5.0	Low	High	Silty clay	CL	A–6.	
1.6	4.5 to 5.0	Low	Very high	Clay to silty clay.	CH–MH	A–7.	
1.6	5.0 to 5.5	Low	High	Silty clay	CL	A–6.	6 inches to 1 foot of silty clay over 5 to 6 feet of silty clay to clay of high plasticity. Poorly drained. On stream terraces.
1.8	4.5 to 5.0	Low	Very high	Clay	MH–CH	A–7.	
1.8	4.5 to 5.0	Low	Very high	Clay	MH–CH	A–7.	

TABLE 18.—*Estimated physical properties*

Map symbol	Soil or land type	Erosion hazard	Hydrologic soil group [1]	Estimated properties of major layers in each soil				
				Major soil layers	Percentage passing—			Permeability [2]
					No. 10 sieve	No. 40 sieve	No. 200 sieve	
				Inches				
Ya	Yahola clay, overwash, 0 to 1 percent slopes.	Low	C.	0 to 12	(100)	(100)	(99 to 100)	Very slow
Yc	Yahola clay, overwash, 1 to 3 percent slopes.	Low	C.	12 to 20	(100)	(100)	(98 to 100)	Moderately slow.
				20 to 40	(100)	(100)	(60 to 70)	Moderate
Yr	Yahola very fine sandy loam, 0 to 1 percent slopes.	Low	B.	0 to 36	(100)	(100)	(75 to 95)	Moderate
Ys	Yahola very fine sandy loam, 1 to 3 percent slopes.	Low	B.					
Yt	Yahola very fine sandy loam, 3 to 8 percent slopes.	Moderate to high.	B.					
Yv	Yahola very fine sandy loam, undulating.	Low	B.					
Yh	Yahola silt loam, 0 to 1 percent slopes.	Low	B.	0 to 10	100	100	80 to 95	Moderately slow to moderate.
Ym	Yahola silt loam, 1 to 3 percent slopes.	Low	B.	10 to 40	100	100	95 to 99	Moderately slow to slow.
Yn	Yahola silty clay loam, 0 to 1 percent slopes.	Low	C.	0 to 6	(100)	(100)	(95 to 99)	Slow
Yo	Yahola silty clay loam, 1 to 3 percent slopes.	Low	C.	6 to 16	(100)	(100)	(99 to 100)	Slow
				16 to 40	(100)	(100)	(98 to 100)	Moderately slow to slow.
Yp	Yahola soils, overflow, 0 to 3 percent slopes.	Low	B.		(100)	(100)	(80 to 100)	Moderately slow.

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[1] The four hydrologic soil groups, as defined in the Soil Conservation Service Engineering Handbook, supplement A, section 4, Hydrology, are based on the intake of water at the end of long-lasting storms that occur after the soil is already wet and swelled, and when the soil is not protected by plants.

Group A contains deep sands that have very little silt and clay. These soils soak up the most rainfall and lose the least in runoff.

Group B contains soils that are mostly sandy and less deep than the soils in group A. Soils in this group absorb more water than average, even after they are thoroughly wet.

Group C consists of shallow soils and soils that contain large amounts of clay and colloidal particles but not so much as the soils in group D. Soils in group C allow less water than average to soak in after the soil is thoroughly wet.

Group D consists mostly of clays that increase greatly in volume when they absorb water. This group also includes some shallow soils that have nearly impermeable layers near the surface. Soils in group D soak up the least rainfall and lose the most in runoff.

significant in engineering—Continued

Estimated properties of major layers in each soil—Con.				Estimated classification			Description of soil and site
Available water capacity [3]	Reaction	Dispersion rate[4]	Shrink-swell potential[5]	USDA texture	Unified	AASHO	
Inches per foot	*pH*						
2.5	7.5 to 8.0	Low	High to very high.	Silty clay or clay.	CH-MH or CH.	A-7.	1 to 1½ feet of fat clay to silty clay over 3 to 4 feet of stratified silty fine sand and silty clay. Well drained. Water table at a depth of more than 6 feet. Formed from Red River alluvium.
2.2	7.5 to 8.0	Moderate	Low to moderate.	Silt loam	CL-ML	A-4.	
1.5	8.0	High	Low	Very fine sandy loam.	ML	A-4.	
1.5 to 2.5	7.5 to 8.0	Moderate to high.	Low	Fine sandy loam to silty clay loam.	ML to CL-ML.	A-4.	3 to 4 feet of stratified silty sand to very fine sand in layers 6 inches or less in thickness. Well drained. Water table at a depth of more than 6 feet. Formed from Red River alluvium.
2.2	8.0	High	Low	Silt loam	ML	A-4.	1 to 1½ feet of silt to silty fine sand over 2 to 3 feet of stratified silty fine sand and silty clay in layers 6 inches or less in thickness. Well drained. Water table at a depth of more than 6 feet. Formed from Red River alluvium.
2.5	8.0	Moderate	Moderate	Stratified silt loam and silty clay.	CL	A-6.	
2.2	8.0	Low	Moderate to high.	Silty clay loam.	CL	A-6.	1 to 2 feet of silty clay over 2 feet of stratified silty sand and silty clay in layers 6 inches to 1 foot in thickness. Well drained. Water table at a depth of more than 6 feet. Formed from Red River alluvium.
2.5	8.0	Low	High	Silty clay	MH-CH	A-7.	
2.2	8.0	High	Moderate	Silt loam to silty clay.	CL-ML	A-6.	
2.2 to 2.5	8.0	High to low	Low to high	Stratified silt loam and silty clay.	ML to MH-CH.	A-4 to A-7.	3 to 4 feet of stratified silty sand and silty clay. Flooded for a long period each year. Formed from Red River alluvium.

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[2] Estimate of rate of absorption of water by uncompacted soil material. The classes of permeability are as follows:

- Very slow, less than 0.05 inch per hour.
- Slow, 0.05 to 0.2 inch per hour.
- Moderately slow, 0.2 to 0.8 inch per hour.
- Moderate, 0.8 to 2.0 inches per hour.
- Rapid, 2.0 to 10.0 inches per hour.
- Very rapid, more than 10.0 inches per hour.

[3] An approximation of the capillary water in the soil when it is wet to field capacity. When the soil is "air dry," this amount of water will wet the soil to a depth of 1 foot without deeper percolation.

[4] The degree to which and rapidity with which the soil structure breaks down or slakes in water. "High" means that the soil slakes readily.

[5] An indication of the volume change to be expected of the soil material with changes in moisture content.

TABLE 19.—*Interpretation of engineering*

[Dashes indicate that practice is

Soil or land type	Estimated construction work weeks per year [1]	Depth to highest annual water table	Suitability of soil material for—					
			Topsoil for vegetation [2]	Source of sand and gravel [3]	Roads and airfields			Dams or levees [6]
					Base course for flexible pavement [4]	Subbase for flexible pavement	Subgrade for rigid pavement [5]	
Acadia complex, mounded (Aa). Acadia silt loam (Ac, Ad). Acadia-Wrightsville complex, mounded (Ae).	18	More than 6 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor to fair.
Amite fine sandy loam (Af, Ag, Ah, Ak, Am). Amite soils (An).	40	More than 10 feet.	Fair to good.	None	Poor to not suitable.	Good in surface layer and substratum; not suitable in subsoil.	Fair in surface layer and substratum; poor in subsoil.	Good
Bibb silt loam (Bb). Bibb, Myatt, and Stough silt loams, overflow (Bc).	18	Less than 3 feet.	Poor	None	Not suitable	Not suitable	Poor in surface layer; not suitable in subsoil.	Poor
Boswell fine sandy loam (Bd, Be, Bf).	30	More than 10 feet.	Poor to fair.	None	Not suitable	Fair in surface layer; not suitable in subsoil and substratum.	Poor in surface layer; not suitable in subsoil and substratum.	Fair to poor.
Boswell sandy clay (Bg).	30	More than 10 feet.	Not suitable.	None	Not suitable	Poor	Not suitable	Poor to fair.
Buxin clay (Bh, Bk, Bm). Buxin silty clay loam (Bu).	18	More than 6 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Buxin complex (Bn, (Bo).	12	Less than 3 feet.	Poor	None	Not suitable	Poor	Not suitable	Poor
Cahaba fine sandy loam (Ca, Cb, Cc). Cahaba and Kalmia very fine sandy loams (Cf). Cahaba very fine sandy loam (Cd). Cahaba-Tilden very fine sandy loams (Ct).	40	More than 6 feet.	Fair to good.	None	Poor to not suitable.	Fair in surface layer and substratum; fair to poor in subsoil.	Fair	Good
Chastain clay (Cy)	12	Soil subject to prolonged overflow.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Gallion clay, overwash (Ga, Gb, Gc). Gallion silty clay loam (Gk).	30	More than 6 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Fair

See footnotes at end of table.

properties of the soils

not applicable to the soil]

Characteristics that affect suitability for—							
			Open-ditch drainage			Land grading or leveling	
Reservoirs	Irrigation	Terraces and diversions	Stability of side slopes	Permissible velocity of water	Intensity of drainage needs	Relative cost [7]	Permissible cut [8]
Low seepage	Low intake rate; low permeability.	Maximum grade on terrace channels.	Fair	High (4 feet per second).	Medium to high on 0 to 1 percent slopes.	----------	
High seepage	Fairly high intake rate; moderate available moisture.	Maximum slope for terracing 8 percent; minimum to medium grade on terrace channels.	----------	----------	----------	----------	
Low to medium seepage.	----------	----------	Poor	Low (1.5 feet per second).	High	----------	
Low seepage	Very slow permeability.	Maximum slope for terracing 5 percent; maximum grade on terrace channels.	----------	----------	----------	----------	
Low seepage	----------	----------	----------	----------	----------	----------	
Low seepage	Soils crack easily; high initial intake rate decreases rapidly.	----------	Fair to good.	High (4 feet per second).	High on 0 to 1 percent slopes.	High	High.
Medium to low seepage.	Soils crack easily; high initial intake rate decreases rapidly.	----------	Poor to fair.	Medium (2.5 feet per second).	High	----------	
High seepage	Moderate intake rate; moderate permeability.	Minimum to medium grade on terraces.	----------	----------	----------	----------	
Low seepage	----------	----------	----------	----------	----------	----------	
Medium to low seepage.	Soils crack; high initial intake rate.	----------	Poor	Medium (2.5 feet per second).	Medium to high on slopes of 0 to 1 percent.	Medium to high.	Low (up to 6 inches).

TABLE 19.—*Interpretation of engineering*

Soil or land type	Estimated construction work weeks per year [1]	Depth to highest annual water table	Suitability of soil material for—					
			Topsoil for vegetation [2]	Source of sand and gravel [3]	Roads and airfields			Dams or levees [6]
					Base course for flexible pavement [4]	Subbase for flexible pavement	Subgrade for rigid pavement [5]	
Gallion silt loam (Gd, Gg, Gh).	36	More than 6 feet.	Good	None	Not suitable	Not suitable	Not suitable	Fair
Gallion soils, mounded (Gm).	30	More than 6 feet.	Poor to fair.	None	Not suitable	Not suitable	Not suitable	Fair
Gore, McKamie, and Hortman soils (Go).	28	More than 6 feet.	Not suitable.	None	Not suitable	Poor in surface layer; not suitable in subsoil and substratum.	Poor in surface layer; not suitable in subsoil and substratum.	Poor to fair.
Gore very fine sandy loam (Gr, Gs, Gv).	28	More than 6 feet.	Poor	None	Not suitable	Poor in surface layer; not suitable in subsoil and substratum.	Poor in surface layer; not suitable in subsoil and substratum.	Fair to poor.
Hannahatchee fine sandy loam (Ha).	36	4 to 6 feet	Good	None	Poor to not suitable.	Good in surface layer; poor in subsoil.	Fair in surface layer; poor in subsoil.	Good
Hortman very fine sandy loam (Hn, Hr).	30	More than 6 feet.	Poor	None	Not suitable	Poor in surface layer; not suitable in subsoil.	Poor in surface layer and subsoil.	Fair to good.
Huckabee loamy fine sand (Hs, Hu).	40	More than 6 feet.	Poor	Fair, contains poorly graded fine sand.	Fair	Good	Fair	Fair to good.
Independence loamy fine sand (In).	40	More than 6 feet.	Poor	Fair, contains poorly graded fine sand.	Fair	Good	Fair to good	Poor
Kalmia very fine sandy loam (Ka).	36	More than 6 feet.	Fair	None	Poor	Fair in surface layer and subsoil; fair to good in substratum.	Fair	Good
Kirvin fine sandy loam (Kr, Ks, Kt, Ku).	40	More than 10 feet.	Fair	None	Poor	Fair in surface layer; poor in subsoil.	Fair in surface layer; poor in subsoil.	Good
Kirvin gravelly fine sandy loam (Kv, Kw, Kx, Ky).	40	More than 10 feet.	Poor	Good, contains fairly thick surface deposits of ironstone gravel.	Fair to good in surface layer; not suitable in subsoil.	Good in surface layer; poor to unsuitable in subsoil.	Good in surface layer; poor in subsoil.	Good

See footnotes at end of table.

properties of the soils—Continued

Characteristics that affect suitability for—		Terraces and diversions	Open-ditch drainage			Land grading or leveling	
Reservoirs	Irrigation		Stability of side slopes	Permissible velocity of water	Intensity of drainage needs	Relative cost [7]	Permissible cut [8]
Medium seepage	Traffic pan forms easily.	------	Poor to fair.	Medium (2.5 feet per second).	Low on slopes of 0 to 1 percent.	Medium	Low to medium (up to 10 inches).
Medium to low seepage.	Irrigation difficult; variable intake rate.	------	Poor	Medium (2.5 feet per second).	Medium to high.	Medium to high.	High.
Low to high seepage (needs intensive site investigation).	------	------	------	------	------	------	
Low seepage	------	------	------	------	------	------	
Medium to low seepage.	Medium infiltration rate; moderate permeability.	Diversions needed in many places.	Good	Medium (2.5 feet per second).	Low to medium.	------	
Low to high seepage (needs intensive site investigation).	Very slow permeability.	Maximum grade on terraces.	------	------	------	------	
High seepage	------	------	------	------	------	------	
High seepage	High intake rate; low available moisture capacity.	------	------	------	------	------	
Medium to high seepage.	Medium intake rate; moderate permeability.	------	------	------	------	------	
Medium to high seepage.	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; medium channel grades.	------	------	------	------	
High to medium seepage.	------	Maximum slope for terracing 8 percent; medium channel grades.	------	------	------	------	

TABLE 19.—*Interpretation of engineering*

Soil or land type	Estimated construction work weeks per year [1]	Depth to highest annual water table	Suitability of soil material for—					
			Topsoil for vegetation [2]	Source of sand and gravel [3]	Roads and airfields			Dams or levees [6]
					Base course for flexible pavement [4]	Subbase for flexible pavement	Subgrade for rigid pavement [5]	
Lakeland and Eustis loamy fine sands (La, Lb, Lc, Ld).	40	More than 10 feet.	Poor	Fair, contains poorly graded fine sand.	Fair	Good	Good	Poor
Luverne fine sandy loam (Lf, Lg, Lh).	36	More than 10 feet.	Fair	None	Poor	Fair in surface layer; poor in subsoil.	Fair	Good
Luverne gravelly fine sandy loam (Lk, Lm).	40	More than 10 feet.	Poor	Fair, contains thin surface deposits of ironstone gravel.	Fair	Good in surface layer; poor in subsoil.	Good in surface layer; poor in subsoil.	Good
Luverne loamy fine sand, thick surface (Ln, Lo).	40	More than 10 feet.	Poor	Poor to fair, contains thin surface deposits of poorly graded fine sand.	Fair	Good in surface layer and substratum; fair in subsoil.	Good in surface layer; fair in subsoil and substratum.	Fair
Luverne soils (Lp)	36	More than 10 feet.	Poor	None	Poor to not suitable.	Fair to poor	Fair	Good
Mantachie very fine sandy loam (Ma).	28	3 to 4 feet	Fair	None	Not suitable	Poor in surface layer; not suitable in subsoil; fair to good in substratum.	Poor	Fair to poor.
McKamie very fine sandy loam (Mb, Mc, Md).	28	More than 6 feet.	Poor	None	Not suitable	Fair in surface soil; not suitable in subsoil.	Fair in surface soil; not suitable in subsoil.	Fair to good.
McKamie and Hortman soils (Me).	28	More than 6 feet.	Not suitable.	None	Not suitable	Poor	Not suitable	Poor to fair.
Miller clay (Mg, Mh, Mk, Mn).	28	More than 6 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Miller clay, overflow (Mm).	28	Soil subject to flooding.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Miller silt loam (Mo, Mp).	28	More than 6 feet.	Good	None	Not suitable	Not suitable	Not suitable	Poor
Miller silty clay loam (Mr).	28	More than 6 feet.	Fair	None	Not suitable	Not suitable	Not suitable	Poor
Mixed alluvial land (Ms).	32	More than 4 feet.	Fair	None	Not suitable	Fair in surface layer and subsoil; poor in substratum.	Fair in surface layer and subsoil; poor in substratum.	Fair

See footnotes at end of table.

properties of the soils—Continued

Characteristics that affect suitability for—			Open-ditch drainage			Land grading or leveling	
Reservoirs	Irrigation	Terraces and diversions	Stability of side slopes	Permissible velocity of water	Intensity of drainage needs	Relative cost [7]	Permissible cut [8]
High seepage	Suitable for sprinkler only; high intake rate; low available moisture capacity.	----------	----------	----------	----------	----------	
Medium to high seepage.	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; medium channel grades.	----------	----------	----------	----------	
High to medium seepage.	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; medium channel grades.	----------	----------	----------	----------	
High seepage	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; low channel grades; outlet protection very important.	----------	----------	----------	----------	
Medium to high seepage.	----------	----------	----------	----------	----------	----------	
Medium to low seepage.	----------	----------	Fair	Medium (2.5 feet per second).	Medium	----------	
Low to high seepage (needs intensive site investigation).	Suitable for sprinkler only.	Maximum slope for terracing 5 percent; maximum channel grades.	----------	----------	----------	----------	
Low to high seepage (needs intensive site investigation).	----------	----------	----------	----------	----------	----------	
Low seepage	Soil cracks easily; high initial intake rate.	----------	Good	High (4.0 feet per second).	High on 0 to 1 percent slopes.	High	High.
Low seepage	----------	----------	----------	----------	----------	----------	
Low seepage	Soil subject to formation of traffic pan.	----------	Good	High (4.0 feet per second).	Medium on 0 to 1 percent slopes.	Medium	Low to medium (4 to 8 inches).
Low seepage	Fairly high initial intake rate.	----------	Good	High (4.0 feet per second).	High	Medium	Medium to high.
Medium seepage	Uneven surface; suitable for sprinkler only.	May need diversion of water from higher land.	Fair	Medium (2.5 feet per second).	Medium to low.	----------	

TABLE 19.—*Interpretation of engineering*

Soil or land type	Estimated construction work weeks per year [1]	Depth to highest annual water table	Suitability of soil material for—					
			Topsoil for vegetation [2]	Source of sand and gravel [3]	Roads and airfields			Dams or levees [6]
					Base course for flexible pavement [4]	Subbase for flexible pavement	Subgrade for rigid pavement [5]	
Mixed wet alluvial land (Mt).	18	Less than 3 feet.	Poor	None	Not suitable	Poor	Poor	Poor
Morse clay (Mu, Mv, Mw, Mx). Morse clay, dark surface (My, Mz).	28	More than 6 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Muskogee complex, mounded (Maa). Muskogee silt loam (Mab, Mac). Muskogee soils (Mad).	32	More than 6 feet.	Fair	None	Not suitable	Not suitable	Not suitable	Good
Myatt complex, mounedd (Mae). Myatt silt loam (Maf). Myatt-Stough complex, overflow (Mag).	16	Less than 3 feet.	Fair	None	Not suitable	Not suitable	Not suitable	Poor
Nacogdoches gravelly fine sandy loam (Na, Nc, Ng).	40	More than 6 feet.	Fair	Good; contains fairly thick surface deposits of ironstone gravel.	Good in surface layer; unsuitable in subsoil and substratum.	Good in surface layer; poor in subsoil; fair in substratum.	Good in surface layer; poor in subsoil; fair in substratum.	Good
Nacogdoches soils (Ns).	40	More than 10 feet.	Poor to good.	Fair; contains thin to fairly thick strata of ironstone.	Good in surface layer; unsuitable in subsoil and substratum.	Good in surface layer; poor in subsoil; fair in substratum.	Good in surface layer; poor in subsoil; fair in substratum.	Good
Ochlockonee and Iuka sandy loams (Oc).	32	More than 4 feet.	Good	None	Not suitable	Poor	Poor	Fair
Orangeburg fine sandy loam (Of, Og, Om, Or). Orangeburg and Ruston fine sandy loams (Ou).	40	More than 10 feet.	Fair	None	Poor to not suitable.	Fair	Fair	Good
Perry clay (Pa)	12	Less than 3 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Perry clay, overflow (Pb). Perry soils, overflow (Pe).	12	Less than 3 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Pheba complex, mounded (Ph). Pheba very fine sandy loam (Pk).	28	4 to 6 feet	Poor	None	Not suitable	Fair in surface layer; poor in subsoil and substratum.	Fair in surface layer; fair to poor in subsoil and substratum.	Fair

See footnotes at end of table.

properties of the soils—Continued

Characteristics that affect suitability for—			Open-ditch drainage			Land grading or leveling	
Reservoirs	Irrigation	Terraces and diversions	Stability of side slopes	Permissible velocity of water	Intensity of drainage needs	Relative cost [7]	Permissible cut [8]
Low to high seepage (needs intensive site investigation).			Poor	Medium (2.5 feet per second).	High		
Low seepage	Soil cracks; high initial intake rate.	Maximum slope for terracing 5 percent; maximum channel grade.					
Low seepage in most places (needs intensive site investigation).	Suitable for sprinkler only.	Maximum slope for terracing 5 percent; use maximum channel grades.					
Low seepage			Poor	Medium (2.5 feet per second).	High		
High seepage	Suitable for sprinkler only.	Maximum slope for terracing 8 percent.					
High seepage							
(Needs intensive site investigation.)			Fair	Medium (2.5 feet per second).	Low to moderate.		
High seepage	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; use minimum grade.					
Low seepage	Very slow intake rate when moist.		Fair to good.	High (4 feet per second).	High	High	High.
Low seepage			Fair to good.	High (4 feet per second).	High		
Low seepage		Maximum grade on terrace channels.					

TABLE 19.—*Interpretation of engineering*

Soil or land type	Estimated construction work weeks per year[1]	Depth to highest annual water table	Suitability of soil material for—					
					Roads and airfields			
			Topsoil for vegetation[2]	Source of sand and gravel[3]	Base course for flexible pavement[4]	Subbase for flexible pavement	Subgrade for rigid pavement[5]	Dams or levees[6]
Prentiss complex, mounded (Pm, Pn). Prentiss very fine sandy loam (Po). Prentiss very fine sandy loam, clay substratum (Pp, Pr, Ps). Prentiss and Stough silt loams, clay substrata (Pt). Prentiss and Tilden very fine sandy loams (Pv, Pw).	30 to 36	More than 4 feet.	Fair	None	Not suitable	Poor in surface layer; poor to not suitable in subsoil and substratum.	Poor	Fair
Riverwash (Ra)	Unpredictable.	Subject to prolonged overflow.	Poor to fair.	Good, contains thick deposits of fine to medium sand or silty sand.	Not suitable	Not suitable	Not suitable	Poor
Roebuck clay (Rb, Rc, Re).	28	More than 6 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Roebuck clay, overflow (Rd).	18	Less than 6 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Roebuck silt loam (Rf).	28	More than 6 feet.	Fair, but very thin (about 6 inches).	None	Not suitable	Not suitable	Not suitable	Poor
Ruston fine sandy loam (Rg, Rh, Rk, Rm).	40	More than 10 feet.	Fair	None	Poor to not suitable in surface layer and substratum; not suitable in subsoil.	Fair to good	Fair	Good
Ruston fine sandy loam, hard substratum (Rn, Ro, Rs, Rt).	36	More than 10 feet.	Fair	None	Not suitable	Fair to poor in surface layer and substratum; poor in subsoil.	Fair in surface layer; poor in subsoil; fair to poor in substratum.	Good
Ruston soils (Ru)	40	More than 10 feet.	Poor	None	Poor	Good	Poor	Good
Savannah and Bowie very fine sandy loams (Sa, Sb).	30 to 36	More than 6 feet.	Fair	None	Not suitable	Fair in surface layer; not suitable in subsoil and substratum.	Fair in surface layer; poor in subsoil; fair to poor in substratum.	Good
Sawyer fine sandy loam (Sc, Sd).	24	More than 6 feet.	Fair	None	Not suitable	Fair in surface layer; poor in subsoil; not suitable in substratum.	Fair in surface layer; fair to poor in subsoil; poor in substratum.	Good

See footnotes at end of table.

properties of the soils—Continued

Characteristics that affect suitability for—			Open-ditch drainage			Land grading or leveling	
Reservoirs	Irrigation	Terraces and diversions	Stability of side slopes	Permissible velocity of water	Intensity of drainage needs	Relative cost [7]	Permissible cut [8]
Medium seepage	Suitable for sprinkler only.	Medium to maximum grade on terrace channels; terrace slopes more than 1 percent.	------	------	------	------	
High seepage	------	------	------	------	------	------	
Low seepage	Soil cracks easily; high initial intake rate.	------	Good	High (4.5 feet per second).	High for 0 to 1 percent slopes.	High	High.
Low seepage	------	------	Good	High (4.5 feet per second).	High	------	
Low seepage	Generally low intake rate.	------	Good	High (4.5 feet per second).	Medium	Medium	Low (up to 4 inches).
Medium to high seepage.	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; use minimum channel grades.	------	------	------	------	
Medium to low seepage.	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; use medium channel grades.	------	------	------	------	
Medium to high seepage.	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; use minimum channel grades.	------	------	------	------	
Low to medium seepage.	Suitable for sprinkler only.	Use medium channel grades.	------	------	------	------	
Low seepage	Suitable for sprinkler only.	Use medium to maximum channel grades.	------	------	------	------	

TABLE 19.—*Interpretation of engineering*

Soil or land type	Estimated construction work weeks per year [1]	Depth to highest annual water table	Suitability of soil material for—					
			Topsoil for vegetation [2]	Source of sand and gravel [3]	Roads and airfields			Dams or levees [6]
					Base course for flexible pavement [4]	Subbase for flexible pavement	Subgrade for rigid pavement [5]	
Shubuta fine sandy loam (Se, Sf, Sg, Sh, Sk).	32	More than 10 feet.	Fair	None	Not suitable.	Fair to poor in surface layer; not suitable in subsoil and substratum.	Fair in surface layer; not suitable in subsoil and substratum.	Good
Shubuta gravelly fine sandy loam (Sm, Sn, So, Sp, Sr).	36	More than 10 feet.	Poor	Good, contains fairly thick surface deposits of ironstone gravel.	Fair in surface layer; unsuitable in subsoil and substratum.	Good in surface layer; poor in subsoil; fair in substratum.	Good in surface layer; poor in subsoil; fair in substratum.	Good
Shubuta soils (Ss)	30	More than 10 feet.	Not suitable.	None	Not suitable	Not suitable	Not suitable	Good
Shubuta-Boswell gravelly sandy loam (St). Shubuta and Cuthbert gravelly sandy loams (Su).	32	More than 10 feet.	Poor	Poor, contains patchy, thin deposits of ironstone.	Not suitable	Fair to poor in surface layer; not suitable in subsoil and substratum.	Not suitable	Good
Stough complex, mounded (Sv). Stough silt loam (Sw). Stough silt loam, clay substratum (Sx, Sy).	24	4 feet	Poor to fair.	None	Not suitable	Not suitable	Not suitable	Poor to fair.
Susquehanna fine sandy loam (Sz). Susquehanna soils (Saa, Sab).	28	More than 6 feet.	Poor	None	Not suitable	Poor in surface layer; not suitable in subsoil.	Poor in surface layer; not suitable in subsoil.	Fair
Tilden soils (Td)	36	More than 6 feet.	Poor	None	Not suitable	Not suitable	Fair to poor in surface layer; poor to not suitable in subsoil and substratum.	Good

See footnotes at end of table.

properties of the soils—Continued

Characteristics that affect suitability for—			Open-ditch drainage			Land grading or leveling	
Reservoirs	Irrigation	Terraces and diversions	Stability of side slopes	Permissible velocity of water	Intensity of drainage needs	Relative cost [7]	Permissible cut [8]
Low seepage	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; use medium channel grades.	-----	-----	-----	-----	-----
Low to high seepage (needs intensive site investigation).	Suitable for sprinkler only.	Maximum slope for terracing 8 percent; use medium channel grades.	-----	-----	-----	-----	-----
Low to high seepage (needs intensive site investigation).	-----	-----	-----	-----	-----	-----	-----
Low to medium seepage.	-----	-----	-----	-----	-----	-----	-----
Low seepage	Low to medium intake rate.	Terrace slopes more than 1 percent; use maximum channel grades.	Poor	Medium (2.5 feet per second).	Medium on 0 to 1 percent slopes.	-----	-----
Low seepage	-----	-----	-----	-----	-----	-----	-----
(Needs intensive site investigation.)	-----	-----	-----	-----	-----	-----	-----

TABLE 19.—*Interpretation of engineering*

Soil or land type	Estimated construction work weeks per year [1]	Depth to highest annual water table	Suitability of soil material for—					
			Topsoil for vegetation [2]	Source of sand and gravel [3]	Roads and airfields			Dams or levees [6]
					Base course for flexible pavement [4]	Subbase for flexible pavement	Subgrade for rigid pavement [5]	
Tilden very fine sandy loam (Tf, Ts, Tv)	36	More than 6 feet.	Fair	None	Not suitable	Not suitable	Fair to poor in surface layer; poor to not suitable in subsoil and substratum.	Good
Vaucluse loamy fine sand (Va, Vc, Vf, Vm, Vs)	36	More than 10 feet.	Poor	Poor, contains thin surface deposits of poorly graded silty fine sand.	Fair in surface layer; poor in subsoil and substratum.	Good in surface layer; fair to poor in subsoil and substratum.	Good in surface layer; fair in subsoil and substratum.	Poor to fair.
Wrightsville complex, mounded (Wr). Wrightsville silt loam (Wt). Wrightsville silty clay (Wv).	18	More than 4 feet.	Poor	None	Not suitable	Not suitable	Not suitable	Poor
Yahola clay, overwash (Ya, Yc). Yahola silty clay loam (Yn, Yo).	32	More than 6 feet.	Poor to fair.	None	Not suitable	Not suitable	Not suitable	Fair
Yahola silt loam (Yh, Ym). Yahola very fine sandy loam (Yr, Ys, Yt, Yv).	32 to 36	More than 6 feet.	Good	None	Not suitable	Not suitable	Not suitable	Fair
Yahola soils, overflow (Yp).	28	More than 6 feet.	Poor to good.	None	Not suitable	Poor to fair	Not suitable	Fair

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[1] An approximation based on factors of soil and site that affect workability in periods of high rainfall. Average weather for the area is assumed.

[2] Natural fertility is not so important to this rating as texture and workability. Fertilizers will be needed on nearly all soils used for topsoil for vegetation.

[3] Sand in this area contains appreciable amounts of finer material. It would need washing if clean sand is required. Deposits of ironstone gravel are in a matrix of sandy loam to sandy clay. There are no known commercial deposits of quartz gravel.

[4] Soils rated "good" generally are relatively high in content of gravel-size fragments with a sandy clay binder. These fragments are known as "native gravel" or "iron ore." Washing, screening, or the addition of sand or stone screenings may be needed to make the material suitable for base courses.

[5] Some materials rated "fair" and most of those rated "good" must have a base or subbase course of coarser grained, nonplastic or slightly plastic material placed on the subgrade to prevent "pumping" of the fine particles from the subgrade through the joints and at the edges of the pavement.

properties of the soils—Continued

Characteristics that affect suitability for—		Terraces and diversions	Open-ditch drainage			Land grading or leveling	
Reservoirs	Irrigation		Stability of side slopes	Permissible velocity of water	Intensity of drainage needs	Relative cost [7]	Permissible cut [8]
(Needs intensive site investigation.)	Medium intake rate; moderate permeability.	Use medium channel grade on terraces.	----------	----------	----------	----------	----------
Medium to high seepage.	Suitable for sprinkler only; high intake rate.	Maximum slope for terracing 5 percent; use minimum channel grades.	----------	----------	----------	----------	----------
Low seepage	Very slow intake rate.	----------	Fair	High (4.0 feet per second).	High	----------	----------
Medium to high seepage if cut below 2 feet.	Soil cracks easily; high initial intake rate.	----------	Fair to poor.	Medium (2.5 feet per second).	Medium on 0 to 1 percent slopes.	High	Medium to high.
Medium to high seepage (needs intensive site investigation).	Medium intake rate; subject to formation of traffic pan.	----------	Poor to fair.	Medium (2.5 feet per second).	Low to medium on 0 to 1 percent slopes.	Low to medium.	High.
Medium to high seepage (needs intensive site investigation).	----------	----------	Poor to fair.	Medium (2.5 feet per second).	High	----------	----------

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[6] Rating based on estimates of internal friction, cohesion, capillarity, elasticity and compressibility, shrink-swell potential, and permeability when compacted. Materials that are difficult to compact or that require close control of moisture during compaction are rated no better than "fair." They need coarser grained materials mixed in during construction. Soils that are high in silt may be rated "poor" because of low shear strength, high dispersion, and resultant susceptibility to piping when soil is carried away by percolating water. The higher the dam or levee, the more important is the selection of suitable soil material. Test data were supplemented by records of local experience in building dams and levees with the various soils.

[7] Relative cost per cubic yard of earth moved, based on workability over a wide range of moisture conditions.

[8] Based on thickness of the surface layer and the desirability of maintaining the same or similar texture to plow depth for the entire length of the plane. Since only alluvial soils are rated, differences in fertility between soil layers of similar texture are relatively unimportant.

Glossary

Aggregate.—A mass or cluster of primary soil particles held together by internal forces.

Alluvium.—Sand, mud, and other sediments deposited on land by streams.

Backwater areas.—Areas on the flood plain behind the natural levees, susceptible to flooding annually.

Buckshot soil.—A clay soil that breaks into a mass of fine, angular or rounded aggregates after one or two cycles of wetting and drying. Also called a stiff soil.

Calcareous.—Of a soil, containing enough calcium carbonate to effervesce when treated with dilute hydrochloric acid; alkaline in reaction because of the presence of calcium carbonate.

Clay.—As a soil separate, mineral soil grains less than 0.002 millimeter in diameter. As a textural class, soil that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Commercial forest.—Forest land that is now producing or capable of producing usable crops of wood and that has not been permanently withdrawn from forest use.

Concretions.—Hard grains, pellets, or nodules formed by the concentration of calcium carbonate, compounds of magnesium or iron, or other compounds that cement the soil grains together.

Crevasse.—A channel cut where water has been diverted out of the main riverbed and around obstructions in the river channel.

Cropland.—Land regularly used for crops, except forest and permanent pasture crops. It includes rotation pasture, cultivated summer fallow, or other land ordinarily used for crops but temporarily idle.

Crumb structure.—Generally soft, small, porous aggregates, irregular in shape but tending to be spherical, as in the A_1 horizon of many soils. Closely related to granular structure.

Duck field.—A field planted with duck food plants, such as browntop millet, smartweed, and corn, then flooded to attract wild ducks.

Eluviation.—The removal of material from a soil horizon, either downward or laterally, in solution or in suspension.

Erosion, accelerated.—Rapid and destructive removal of soil material by water or wind.

Erosion, geologic.—The natural and normal wearing away of the earth's surface that takes place in an undisturbed landscape.

Fertility.—The presence in a soil of the necessary elements, in sufficient amounts, in the proper balance, and in available form, for the growth of specified plants, when other factors, such as light, temperature, and the physical condition of the soil, are favorable.

Field capacity.—The moisture content of a soil, expressed as a percentage of oven-dry weight, after the gravitational or free water has been allowed to drain, usually for 2 or 3 days; the field moisture content 2 or 3 days after a soaking rain.

Fragipan.—A dense and brittle layer that is hard because of density or compactness rather than because of a high clay content or cementation. Removed fragments are friable, but in place the pan is so dense that roots do not penetrate it and water moves through it very slowly.

Gilgai microrelief.—A succession of enclosed microbasins and microknolls in nearly level areas, or of microvalleys and microridges that run with the slope; caused by the expansion and contraction of clay soils.

Glauconitic.—Containing glauconite, a silicate of iron and potassium that is abundant in greensand.

Granular.—Consisting of firm, small, roughly spherical aggregates, either hard or soft but usually more firm than crumb aggregates, and without the distinct faces characteristic of blocky aggregates.

Gravel.—A mass of rounded rock fragments between 2.0 millimeters and 3 inches in diameter.

Great soil group.—A broad group of soils having internal soil characteristics in common.

Green-tree reservoir.—A natural hardwood timberland flooded late in fall and in winter to attract wild ducks.

Horizon, soil.—A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil-forming processes.

Horizon A.—The surface horizon of a mineral soil, having maximum biological activity, or eluviation (removal of materials dissolved or suspended in water), or both.

Horizon B.—A soil horizon, usually beneath an A horizon, or surface soil, in which (1) clay, iron, or aluminum, with accessory organic matter, has accumulated as a result of removal of material in suspension from the A horizon or by clay development in place; (2) the structure is blocky or prismatic; or (3) there is some combination of these features. In soils that have distinct profiles, the B horizon is roughly equivalent to what is generally termed the subsoil.

Horizon C.—The unconsolidated rock material in the lower part of the soil profile, like that from which the upper horizons (or at least a part of the B horizon) have developed.

Horizon D.—Any stratum underlying the soil profile that is unlike the material from which the soil has formed.

Illuviation.—The accumulation in a soil horizon of material moved downward or laterally in solution or, less commonly, in suspension.

Interlevee lowland.—A former channel of the river, since drained and filled in with finer sediments; an elongated, irregular area on the flood plain, enclosed on all sides by natural levees.

Ironstone.—Generally, gravel-size hard concretions and concretionary fragments that are high in iron as well as cemented sand grains and clay.

Krotovina.—An old animal burrow in one soil horizon filled with material transported from another horizon.

Massive.—Of a soil, structureless; consisting of a uniform, cohesive mass.

Montmorillonite.—A finely platy, alumino-silicate clay mineral that expands and contracts with the absorption and loss of water. It has a high cation-exchange capacity and is plastic and sticky when moist.

Mottled.—Irregularly marked with spots of color. A common cause of mottling is imperfect or impeded drainage.

Natural levee.—A low, ridgelike deposit immediately adjacent to the stream channel. It forms from the coarser and heavier material carried by flood water and deposited when the velocity of the water was checked as it left the river channel and spread over the flood plain. The height of the levee generally indicates the difference in stage level between ordinary floods and low water. The average levee is slightly more than a mile wide and less than 15 feet high. It slopes downward from the river's edge to the backswamp areas at an average rate of 3 or 4 feet per mile.

Parent material.—The weathered rock or partly weathered soil material from which a soil has formed; the C horizon.

Perched water table.—A temporary water table, usually near the surface, caused by very slowly permeable underlying material, such as a fragipan or dense clay.

Permeable.—Easily penetrated by water and air.

Point bar.—A series of alternating curved ridges and intervening swales, formed by sand deposited on the inside of bend in a stream channel. When the stream cuts a new channel through the bend, the point bar is cut off (*4*).

Poorly graded.—Of a soil, consisting mostly of particles about the same size, or lacking one or more intermediate sizes.

Precision grading.—Shaping the land surface to a planned grade.

Profile, soil.—A vertical section of the soil, extending through all the horizons and into the parent material.

Reaction.—The degree of acidity or alkalinity of the soil mass, expressed in pH values or in words, as follows:

	pH		*pH*
Extremely acid	below 4. 5.	Neutral	6. 6 to 7. 3.
Very strongly acid.	4. 5 to 5. 0.	Mildly alkaline	7. 4 to 7. 8.
Strongly acid	5. 1 to 5. 5.	Moderately alkaline.	7. 9 to 8. 4.
Medium acid	5. 6 to 6. 0.	Strongly alkaline	8. 5 to 9. 0.
Slightly acid	6. 1 to 6. 5.	Very strongly alkaline.	9. 1 and higher.

Red-bed sediments.—Generally reddish-brown, slightly to moderately alkaline and calcareous sediments, deposited as alluvium by the Red River. These sediments originated in the subhumid plains and prairies of western Oklahoma and Texas and the extreme eastern part of New Mexico.

Relief.—The elevations or inequalities of land surface, considered collectively.

Reticulate mottling.—A network of coarse streaks of different colors in a soil or in parent material.

Rim swamp.—A lowland area between the flood plain and the hills.

Sand.—As a soil separate, individual mineral particles, mostly of quartz, between 0.05 millimeter and 2.0 millimeters in size. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Series, soil.—A group of soils that have horizons similar in differentiating characteristics, except for texture of the surface soil, and in arrangement in the profile, and that formed from a particular type of parent material.

Silt.—As a soil separate, individual mineral particles between 0.002 millimeter and 0.05 millimeter in size. As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Single grain.—Of a soil, structureless; consisting of separate, noncohering particles.

Solum.—The upper part of the soil profile, above the parent material, in which the processes of soil formation are taking place.

Stiff soil.—See Buckshot soil.

Structure, soil.—The aggregation of primary soil particles into compound particles or clusters of primary particles; the aggregates are separated by surfaces of weakness. Soil structure is classified according to grade, class, and type.

Grade.—Distinctness of aggregation. It is described as weak, moderate, or strong.

Class.—Size of aggregates. It is described as very fine or very thin, fine or thin, medium, coarse or thick, and very coarse or very thick.

Type.—Shape and arrangement of aggregates. The common types are platy, prismatic, columnar, blocky, subangular blocky, granular, and crumb.

Subsoil.—Technically, the B horizon; roughly, that part of the profile below plow depth.

Substratum.—Any layer beneath the solum.

Surface soil.—The soil ordinarily moved in tillage, or its equivalent in uncultivated soil; about 5 to 8 inches in thickness.

Texture, soil.—The relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of sand, silt, and clay. A coarse-textured soil is one high in content of sand; a fine-textured soil is one high in content of clay.

Traffic pan.—A subsurface layer that has been so compacted by the application of weight (that is, by tractors and other machinery) that it interferes with development of roots and movement of water. Also called a plowsole or a plowpan.

Trafficability.—The freedom of or limitation on use of equipment imposed by soil characteristics, such as texture, wetness, slope, and gravel content.

Type, soil.—A subdivision of a soil series, based on the texture of the surface soil.

Upland (geologic).—Land consisting of material unworked by water in recent geologic time and lying, in general, at higher elevations than the alluvial plain or stream terrace.

Vesicular.—Characterized by round or egg-shaped cavities, or vesicles.

Water table.—The upper limit of the part of the soil or underlying rock material that is wholly saturated with water.

Well graded.—Of a soil, consisting of primary particles of all sizes, from the largest to the smallest, and having a small proportion of the small sizes.

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GUIDE TO MAPPING UNITS, CAPABILITY UNITS, AND WOODLAND SUITABILITY GROUPS

[See table 4, p. 13, for approximate acreage and proportionate extent of soils; table 5, p. 69, for estimated average yields per acre; and table 17, p. 96, table 18, p. 106, and table 19, p. 126, for information on engineering properties of the soils]

Map symbol		*Page*	*Capability unit*	*Page*	*Woodland group*	*Page*
Aa	Acadia complex, mounded, 0 to 3 percent slopes	15	IIIw-4	65	7	78
Ac	Acadia silt loam, 0 to 1 percent slopes	12	IIIw-4	65	7	78
Ad	Acadia silt loam, 1 to 3 percent slopes	15	IIIe-5	63	7	78
Ae	Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes	15	IIIw-4	65	7	78
Af	Amite fine sandy loam, 1 to 5 percent slopes	16	IIe-3	58	2	76
Ag	Amite fine sandy loam, 1 to 5 percent slopes, eroded	17	IIe-3	58	2	76
Ah	Amite fine sandy loam, 5 to 8 percent slopes, eroded	17	IIIe-4	62	2	76
Ak	Amite fine sandy loam, 8 to 20 percent slopes, eroded	17	VIe-1	67	2	76
Am	Amite fine sandy loam, thick surface, 1 to 5 percent slopes	17	IIe-3	58	2	76
An	Amite soils, 5 to 20 percent slopes, severely eroded	17	VIIe-1	68	2	76
Bb	Bibb silt loam	17	Vw-1	66	4	76
Bc	Bibb, Myatt, and Stough silt loams, overflow	18	Vw-1	66	4	76
Bd	Boswell fine sandy loam, 1 to 5 percent slopes, eroded	18	IIIe-6	63	6	77
Be	Boswell fine sandy loam, 5 to 8 percent slopes, eroded	18	VIe-2	67	6	77
Bf	Boswell fine sandy loam, 8 to 20 percent slopes, eroded	19	VIIe-2	68	6	77
Bg	Boswell sandy clay, 5 to 8 percent slopes, severely eroded	19	VIIe-2	68	10	79
Bh	Buxin clay, 0 to 1 percent slopes	19	IIIw-1	64	(1)	-----
Bk	Buxin clay, 1 to 3 percent slopes	19	IIIe-1	61	(1)	-----
Bm	Buxin clay, undulating	20	IIIw-2	64	(1)	-----
Bn	Buxin complex, 0 to 3 percent slopes	20	IIIw-2	64	(1)	-----
Bo	Buxin complex, overflow, 0 to 3 percent slopes	20	Vw-2	66	(1)	-----
Bu	Buxin silty clay loam, 0 to 1 percent slopes	20	IIw-1	58	(1)	-----
Ca	Cahaba fine sandy loam, 1 to 5 percent slopes	20	IIe-3	58	2	76
Cb	Cahaba fine sandy loam, 1 to 5 percent slopes, eroded	20	IIe-3	58	2	76
Cc	Cahaba fine sandy loam, 5 to 8 percent slopes, eroded	21	IIIe-4	62	2	76
Cd	Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded	21	IIe-3	58	2	76
Cf	Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes	21	IIe-3	58	2	76
Ct	Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes	21	IIe-3	58	2	76
Cy	Chastain clay	21	Vw-1	66	(1)	-----
Ga	Gallion clay, overwash, 0 to 1 percent slopes	22	IIIw-1	64	(1)	-----
Gb	Gallion clay, overwash, 1 to 3 percent slopes	23	IIIe-1	61	(1)	-----
Gc	Gallion clay, overwash, undulating	23	IIIw-2	64	(1)	-----
Gd	Gallion silt loam, 0 to 1 percent slopes	22	I-2	57	(1)	-----
Gg	Gallion silt loam, 1 to 3 percent slopes	22	IIe-2	58	(1)	-----
Gh	Gallion silt loam, 3 to 5 percent slopes	22	IIIe-3	62	(1)	-----
Gk	Gallion silty clay loam, 0 to 1 percent slopes	23	IIw-2	59	(1)	-----
Gm	Gallion soils, mounded, 0 to 1 percent slopes	23	IIw-2	59	(1)	-----
Go	Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded	24	VIIe-2	68	10	79
Gr	Gore very fine sandy loam, 1 to 5 percent slopes	23	VIe-2	67	10	79
Gs	Gore very fine sandy loam, 1 to 5 percent slopes, eroded	24	VIe-2	67	10	79
Gv	Gore very fine sandy loam, 5 to 16 percent slopes, eroded	24	VIIe-2	68	10	79
Ha	Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes	24	IIw-5	61	1	75
Hn	Hortman very fine sandy loam, 1 to 5 percent slopes, eroded	25	IIIe-6	63	6	77
Hr	Hortman very fine sandy loam, 5 to 8 percent slopes, eroded	25	VIe-2	67	6	77
Hs	Huckabee loamy fine sand, 1 to 5 percent slopes	25	IIIs-1	65	8	78
Hu	Huckabee loamy fine sand, 5 to 20 percent slopes	25	VIIe-1	68	8	78
In	Independence loamy fine sand, 0 to 1 percent slopes	26	IIIs-1	65	8	78
Ka	Kalmia very fine sandy loam, 0 to 1 percent slopes	26	I-3	57	2	76
Kr	Kirvin fine sandy loam, 1 to 5 percent slopes, eroded	28	IIIe-4	62	5	77
Ks	Kirvin fine sandy loam, 5 to 8 percent slopes, eroded	28	IVe-1	65	5	77
Kt	Kirvin fine sandy loam, 8 to 30 percent slopes	28	VIe-1	67	5	77
Ku	Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded	28	VIIe-1	68	5	77
Kv	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes	27	IIIe-4	62	9	79
Kw	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded	27	IIIe-4	62	9	79
Kx	Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded	27	IVe-1	65	9	79
Ky	Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded	27	VIe-1	67	9	79
La	Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes	29	IIIs-1	65	8	78
Lb	Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes	29	IVe-2	66	8	78
Lc	Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes	28	VIIe-1	68	8	78
Ld	Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded	29	VIIe-1	68	8	78
Lf	Luverne fine sandy loam, 1 to 5 percent slopes, eroded	30	IIIe-4	62	5	77
Lg	Luverne fine sandy loam, 5 to 8 percent slopes, eroded	30	IVe-1	65	5	77
Lh	Luverne fine sandy loam, 8 to 20 percent slopes, eroded	30	VIe-1	67	5	77
Lk	Luverne gravelly fine sandy loam, 1 to 5 percent slopes	30	IIIe-4	62	9	79
Lm	Luverne gravelly fine sandy loam, 5 to 8 percent slopes	30	IVe-1	65	9	79
Ln	Luverne loamy fine sand, thick surface, 1 to 5 percent slopes	30	IIIe-4	62	5	77
Lo	Luverne loamy fine sand, thick surface, 5 to 8 percent slopes	30	IIIe-4	62	5	77
Lp	Luverne soils, 1 to 20 percent slopes, severely eroded	30	VIIe-1	68	9	79
Ma	Mantachie very fine sandy loam	31	Vw-1	66	1	75
Mb	McKamie very fine sandy loam, 1 to 5 percent slopes	32	IIIe-6	63	6	77
Mc	McKamie very fine sandy loam, 1 to 5 percent slopes, eroded	32	IIIe-6	63	6	77

See footnote at end of table.

GUIDE TO MAPPING UNITS, CAPABILITY UNITS, AND WOODLAND SUITABILITY GROUPS—Continued

Map symbol		*Page*	*Capability units*	*Page*	*Woodland group*	*Page*
Md	McKamie very fine sandy loam, 5 to 8 percent slopes, eroded	31	VIe-2	67	6	77
Me	McKamie and Hortman soils, 8 to 20 percent slopes	32	VIIe-2	68	6	77
Mg	Miller clay, 0 to 1 percent slopes	32	IIIw-1	64	(1)	-----
Mh	Miller clay, 1 to 3 percent slopes	32	IIIe-1	61	(1)	-----
Mk	Miller clay, 3 to 8 percent slopes	32	IIIe-1	61	(1)	-----
Mm	Miller clay, overflow, 0 to 1 percent slopes	33	Vw-2	66	(1)	-----
Mn	Miller clay, undulating	32	IIIw-2	64	(1)	-----
Mo	Miller silt loam, 0 to 1 percent slopes	33	I-1	56	(1)	-----
Mp	Miller silt loam, 1 to 3 percent slopes	33	IIe-1	57	(1)	-----
Mr	Miller silty clay loam, 0 to 1 percent slopes	33	IIw-1	58	(1)	-----
Ms	Mixed alluvial land	33	IIw-5	61	1	75
Mt	Mixed wet alluvial land	33	Vw-1	66	4	76
Mu	Morse clay, 1 to 5 percent slopes, eroded	34	IIIe-7	63	12	80
Mv	Morse clay, 5 to 8 percent slopes, eroded	34	VIe-3	68	12	80
Mw	Morse clay, 8 to 20 percent slopes, eroded	34	VIIe-3	68	12	80
Mx	Morse clay, 3 to 8 percent slopes, severely eroded	34	VIIe-3	68	12	80
My	Morse clay, dark surface, 1 to 5 percent slopes	35	IIIe-7	63	12	80
Mz	Morse clay, dark surface, 1 to 5 percent slopes, eroded	34	IIIe-7	63	12	80
Maa	Muskogee complex, mounded, 1 to 3 percent slopes	35	IIIe-5	63	7	78
Mab	Muskogee silt loam, 1 to 5 percent slopes	35	IIIe-5	63	6	77
Mac	Muskogee silt loam, 1 to 5 percent slopes, eroded	35	IIIe-5	63	6	77
Mad	Muskogee soils, 1 to 8 percent slopes, severely eroded	35	VIIe-2	68	10	79
Mae	Myatt complex, mounded	36	IVw-1	66	11	80
Maf	Myatt silt loam	36	IVw-1	66	11	80
Mag	Myatt-Stough complex, overflow	36	Vw-1	66	4	76
Na	Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded	37	IIIe-4	62	9	79
Nc	Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded	36	IIIe-4	62	9	79
Ng	Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded	37	VIe-1	67	9	79
Ns	Nacogdoches soils, 5 to 30 percent slopes, severely eroded	37	VIIe-1	68	9	79
Oc	Ochlockonee and Iuka sandy loams	37	IIw-5	61	1	75
Of	Orangeburg fine sandy loam, 1 to 5 percent slopes	38	IIIe-4	62	2	76
Og	Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded	38	IIIe-4	62	2	76
Om	Orangeburg fine sandy loam, 5 to 8 percent slopes	38	IIIe-4	62	2	76
Or	Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded	38	IIIe-4	62	2	76
Ou	Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded	38	VIe-1	67	2	76
Pa	Perry clay	39	IIIw-3	64	(1)	-----
Pb	Perry clay, overflow	39	Vw-2	66	(1)	-----
Pe	Perry soils, overflow	39	Vw-2	66	(1)	-----
Ph	Pheba complex, mounded, 0 to 3 percent slopes	40	IIIw-4	65	3	76
Pk	Pheba very fine sandy loam, 0 to 3 percent slopes	39	IIw-3	59	3	76
Pm	Prentiss complex, mounded, 0 to 1 percent slopes	41	IIIw-4	65	3	76
Pn	Prentiss complex, mounded, 1 to 5 percent slopes	41	IIIe-5	63	3	76
Po	Prentiss very fine sandy loam, 0 to 1 percent slopes	41	I-3	57	5	77
Pp	Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes	41	IIw-3	59	3	76
Pr	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes	40	IIe-3	58	3	76
Ps	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded	41	IIe-3	58	3	76
Pt	Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes	41	IIw-3	59	3	76
Pv	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes	41	IIe-3	58	5	77
Pw	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded	41	IIe-3	58	5	77
Ra	Riverwash	42	Vw-3	67	-------	-----
Rb	Roebuck clay, 0 to 1 percent slopes	42	IIIw-1	64	(1)	-----
Rc	Roebuck clay, 1 to 3 percent slopes	42	IIIe-1	61	(1)	-----
Rd	Roebuck clay, overflow, 0 to 1 percent slopes	43	Vw-2	66	(1)	-----
Re	Roebuck clay, undulating	42	IIIw-2	64	(1)	-----
Rf	Roebuck silt loam, 0 to 1 percent slopes	43	IIw-2	59	(1)	-----
Rg	Ruston fine sandy loam, 1 to 5 percent slopes	44	IIIe-4	62	2	76
Rh	Ruston fine sandy loam, 1 to 5 percent slopes, eroded	44	IIIe-4	62	2	76
Rk	Ruston fine sandy loam, 5 to 8 percent slopes	44	IIIe-4	62	2	76
Rm	Ruston fine sandy loam, 5 to 8 percent slopes, eroded	44	IIIe-4	62	2	76
Rn	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes	43	IIIe-4	62	5	77
Ro	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded	43	IIIe-4	62	5	77
Rs	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes	44	IVe-1	65	5	77
Rt	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes, eroded	44	IVe-1	65	5	77
Ru	Ruston soils, 1 to 8 percent slopes, severely eroded	44	VIIe-1	68	5	77
Sa	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes	44	IIIe-4	62	5	77
Sb	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded	45	IIIe-4	62	5	77
Sc	Sawyer fine sandy loam, 1 to 5 percent slopes	46	IIIe-5	63	7	78
Sd	Sawyer fine sandy loam, 1 to 5 percent slopes, eroded	45	IIIe-5	63	7	78
Se	Shubuta fine sandy loam, 1 to 5 percent slopes	47	IIIe-4	62	5	77
Sf	Shubuta fine sandy loam, 1 to 5 percent slopes, eroded	46	IIIe-4	62	5	77
Sg	Shubuta fine sandy loam, 5 to 8 percent slopes	47	IVe-1	65	5	77
Sh	Shubuta fine sandy loam, 5 to 8 percent slopes, eroded	47	IVe-1	65	5	77
Sk	Shubuta fine sandy loam, 8 to 16 percent slopes, eroded	47	VIe-1	67	5	77
Sm	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes	47	IIIe-4	62	9	79

See footnote at end of table.

GUIDE TO MAPPING UNITS, CAPABILITY UNITS, AND WOODLAND SUITABILITY GROUPS—Continued

Map symbol		*Page*	*Capability units*	*Page*	*Woodland group*	*Page*
Sn	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded	47	IIIe–4	62	9	79
So	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes	47	IVe–1	65	9	79
Sp	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded	47	IVe–1	65	9	79
Sr	Shubuta gravelly fine sandy loam, 8 to 20 percent slopes	47	VIe–1	67	9	79
Ss	Shubuta soils, 5 to 30 percent slopes, severely eroded	48	VIIe–2	68	9	79
St	Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded	48	VIIe–2	68	9	79
Su	Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes	48	VIIe–2	68	9	79
Sv	Stough complex, mounded, 0 to 1 percent slopes	49	IIIw–4	65	3	76
Sw	Stough silt loam, 0 to 3 percent slopes	49	IIw–3	59	3	76
Sx	Stough silt loam, clay substratum, 0 to 1 percent slopes	48	IIw–3	59	3	76
Sy	Stough silt loam, clay substratum, 1 to 3 percent slopes	49	IIw–3	59	3	76
Sz	Susquehanna fine sandy loam, 1 to 8 percent slopes	50	VIe–2	67	10	79
Saa	Susquehanna soils, 8 to 30 percent slopes, eroded	49	VIIe–2	68	10	79
Sab	Susquehanna soils, 5 to 30 percent slopes, severely eroded	50	VIIe–2	68	10	79
Td	Tilden soils, 1 to 8 percent slopes, severely eroded	51	VIIe–1	68	2	76
Tf	Tilden very fine sandy loam, 0 to 1 percent slopes	51	I–3	57	2	76
Ts	Tilden very fine sandy loam, 1 to 5 percent slopes	51	IIe–3	58	2	76
Tv	Tilden very fine sandy loam, 1 to 5 percent slopes, eroded	50	IIe–3	58	2	76
Va	Vaucluse loamy fine sand, 1 to 5 percent slopes	51	IIIe–4	62	5	77
Vc	Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded	51	IIIe–4	62	5	77
Vf	Vaucluse loamy fine sand, 5 to 8 percent slopes	52	IVe–1	65	5	77
Vm	Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded	52	IVe–1	65	5	77
Vs	Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded	52	VIe–1	67	5	77
Wr	Wrightsville complex, mounded	52	IVw–1	66	11	80
Wt	Wrightsville silt loam	52	IVw–1	66	11	80
Wv	Wrightsville silty clay	53	IVw–1	66	11	80
Ya	Yahola clay, overwash, 0 to 1 percent slopes	54	IIIw–1	64	(1)	-----
Yc	Yahola clay, overwash, 1 to 3 percent slopes	54	IIIe–1	61	(1)	-----
Yh	Yahola silt loam, 0 to 1 percent slopes	53	I–1	56	(1)	-----
Ym	Yahola silt loam, 1 to 3 percent slopes	54	IIe–1	57	(1)	-----
Yn	Yahola silty clay loam, 0 to 1 percent slopes	54	Hw–1	58	(1)	-----
Yo	Yahola silty clay loam, 1 to 3 percent slopes	54	IIe–1	57	(1)	-----
Yp	Yahola soils, overflow, 0 to 3 percent slopes	54	Vw–2	66	(1)	-----
Yr	Yahola very fine sandy loam, 0 to 1 percent slopes	53	I–1	56	(1)	-----
Ys	Yahola very fine sandy loam, 1 to 3 percent slopes	54	IIe–1	57	(1)	-----
Yt	Yahola very fine sandy loam, 3 to 8 percent slopes	54	IIIe–2	61	(1)	-----
Yv	Yahola very fine sandy loam, undulating	54	IIw–4	60	(1)	-----

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[1] This soil is not suited to pines but can be used to grow hardwoods.

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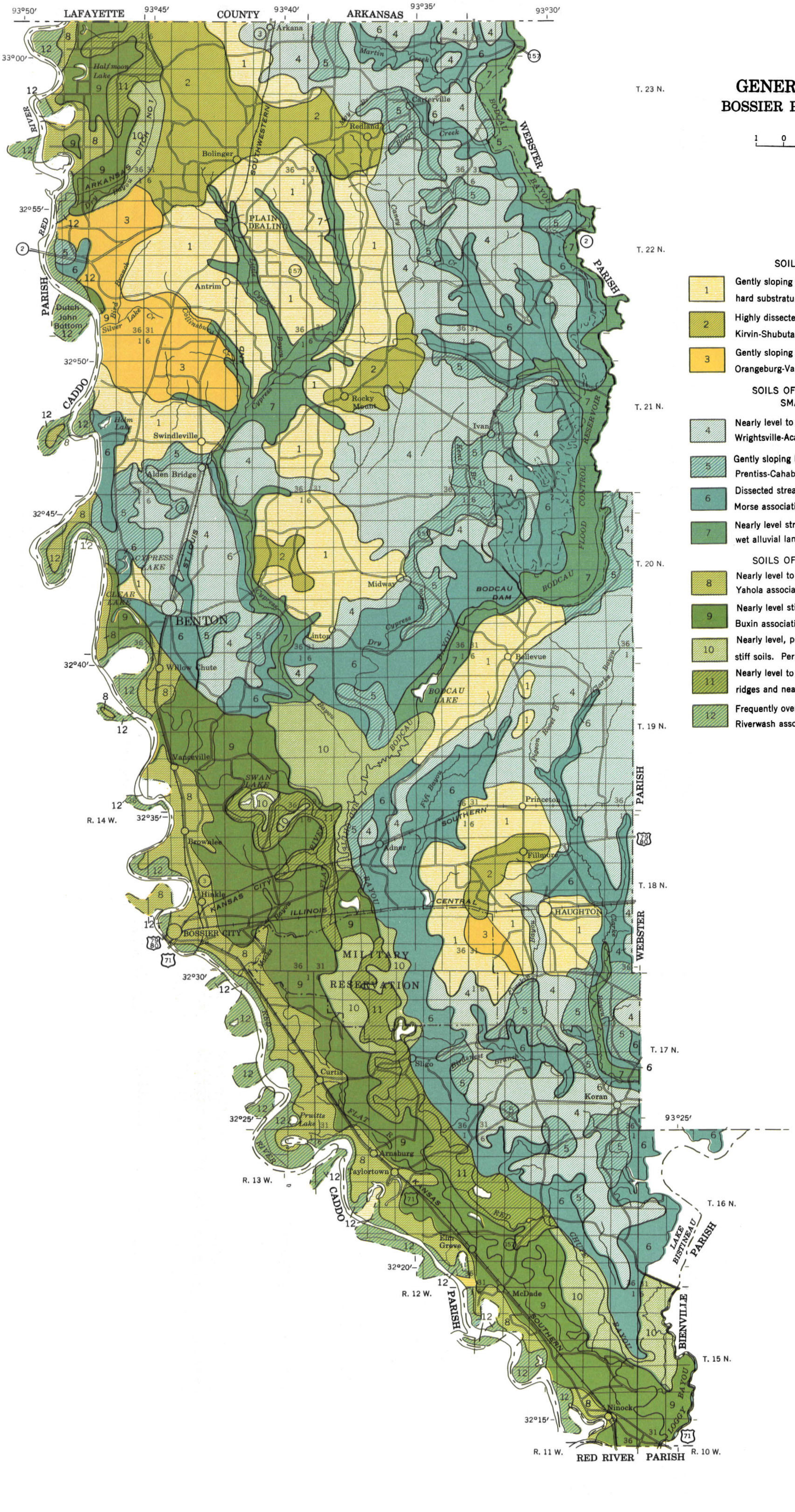


GENERAL SOIL MAP
BOSSIER PARISH, LOUISIANA

1 0 1 2 3 4 Miles

N

SOILS OF THE UPLANDS

1	Gently sloping to rolling uplands. Shubuta-Ruston, hard substratum, association.
2	Highly dissected steep slopes and narrow ridgetops. Kirvin-Shubuta-Susquehanna association.
3	Gently sloping to hilly sandy uplands. Lakeland-Eustis-Orangeburg-Vaucluse association.

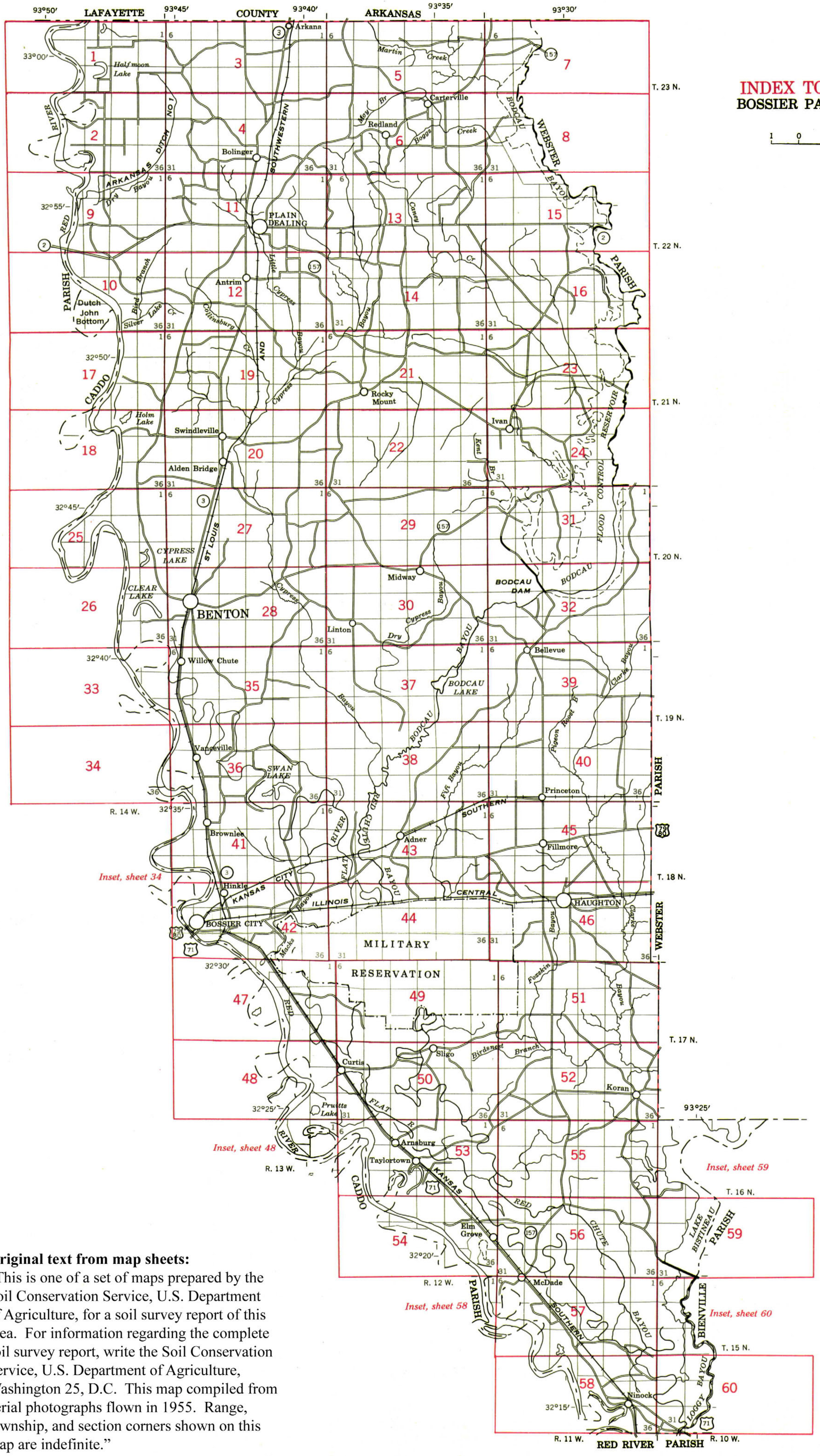
SOILS OF THE STREAM TERRACES AND SMALL STREAM BOTTOMS

4	Nearly level to very gently sloping terraces. Wrightsville-Acadia association.
5	Gently sloping higher parts of stream terraces. Prentiss-Cahaba-Tilden association.
6	Dissected stream terraces. Gore-McKamie-Morse association.
7	Nearly level stream bottoms and terraces. Bibb-Mixed wet alluvial land-Myatt association.

SOILS OF THE RED RIVER BOTTOM LANDS

8	Nearly level to very gently sloping front lands. Yahola association.
9	Nearly level stiff or buckshot soils. Miller-Roebuck-Buxin association.
10	Nearly level, poorly drained to somewhat poorly drained stiff soils. Perry-Buxin association.
11	Nearly level to gently sloping silty to clayey soils on low ridges and near old channels. Gallion association.
12	Frequently overflowed land on the flood plain. Riverwash association.

INDEX TO MAP SHEETS
BOSSIER PARISH, LOUISIANA



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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

BOSSIER PARISH, LOUISIANA

LOUISIANA AGRICULTURAL EXPERIMENT STATION

SOIL LEGEND

SYMBOL	NAME
Aa	Acadia complex, mounded, 0 to 3 percent slopes
Ac	Acadia silt loam, 0 to 1 percent slopes
Ad	Acadia silt loam, 1 to 3 percent slopes
Ae	Acadia-Wrightsville complex, mounded, 0 to 3 percent slopes
Af	Amite fine sandy loam, 1 to 5 percent slopes
Ag	Amite fine sandy loam, 1 to 5 percent slopes, eroded
Ah	Amite fine sandy loam, 5 to 8 percent slopes, eroded
Ak	Amite fine sandy loam, 8 to 20 percent slopes, eroded
Am	Amite fine sandy loam, thick surface, 1 to 5 percent slopes
An	Amite soils, 5 to 20 percent slopes, severely eroded
Bb	Bibb silt loam
Bc	Bibb, Myatt, and Stough silt loams, overflow
Bd	Boswell fine sandy loam, 1 to 5 percent slopes, eroded
Be	Boswell fine sandy loam, 5 to 8 percent slopes, eroded
Bf	Boswell fine sandy loam, 8 to 20 percent slopes, eroded
Bg	Boswell sandy clay, 5 to 8 percent slopes, severely eroded
Bh	Buxin clay, 0 to 1 percent slopes
Bk	Buxin clay, 1 to 3 percent slopes
Bm	Buxin clay, undulating
Bn	Buxin complex, 0 to 3 percent slopes
Bo	Buxin complex, overflow, 0 to 3 percent slopes
Bu	Buxin silty clay loam, 0 to 1 percent slopes
Ca	Cahaba fine sandy loam, 1 to 5 percent slopes
Cb	Cahaba fine sandy loam, 1 to 5 percent slopes, eroded
Cc	Cahaba fine sandy loam, 5 to 8 percent slopes, eroded
Cd	Cahaba very fine sandy loam, 1 to 5 percent slopes, eroded
Cf	Cahaba and Kalmia very fine sandy loams, 1 to 5 percent slopes
Ct	Cahaba-Tilden very fine sandy loams, 1 to 5 percent slopes
Cy	Chastain clay
Ga	Gallion clay, overwash, 0 to 1 percent slopes
Gb	Gallion clay, overwash, 1 to 3 percent slopes
Gc	Gallion clay, overwash, undulating
Gd	Gallion silt loam, 0 to 1 percent slopes
Gg	Gallion silt loam, 1 to 3 percent slopes
Gh	Gallion silt loam, 3 to 5 percent slopes
Gk	Gallion silty clay loam, 0 to 1 percent slopes
Gm	Gallion soils, mounded, 0 to 1 percent slopes
Go	Gore, McKamie, and Hortman soils, 1 to 20 percent slopes, severely eroded
Gr	Gore very fine sandy loam, 1 to 5 percent slopes
Gs	Gore very fine sandy loam, 1 to 5 percent slopes, eroded
Gv	Gore very fine sandy loam, 5 to 16 percent slopes, eroded
Ha	Hannahatchee fine sandy loam, local alluvium, 1 to 5 percent slopes
Hn	Hortman very fine sandy loam, 1 to 5 percent slopes, eroded
Hr	Hortman very fine sandy loam, 5 to 8 percent slopes, eroded
Hs	Huckabee loamy fine sand, 1 to 5 percent slopes
Hu	Huckabee loamy fine sand, 5 to 20 percent slopes
In	Independence loamy fine sand, 0 to 1 percent slopes
Ka	Kalmia very fine sandy loam, 0 to 1 percent slopes
Kr	Kirvin fine sandy loam, 1 to 5 percent slopes, eroded
Ks	Kirvin fine sandy loam, 5 to 8 percent slopes, eroded
Kt	Kirvin fine sandy loam, 8 to 30 percent slopes
Ku	Kirvin fine sandy loam, 5 to 16 percent slopes, severely eroded
Kv	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes
Kw	Kirvin gravelly fine sandy loam, 1 to 5 percent slopes, eroded
Kx	Kirvin gravelly fine sandy loam, 5 to 8 percent slopes, eroded
Ky	Kirvin gravelly fine sandy loam, 8 to 30 percent slopes, eroded
La	Lakeland and Eustis loamy fine sands, 1 to 5 percent slopes
Lb	Lakeland and Eustis loamy fine sands, 5 to 8 percent slopes
Lc	Lakeland and Eustis loamy fine sands, 8 to 20 percent slopes
Ld	Lakeland and Eustis loamy fine sands, 5 to 16 percent slopes, severely eroded

SYMBOL	NAME
Lf	Luverne fine sandy loam, 1 to 5 percent slopes, eroded
Lg	Luverne fine sandy loam, 5 to 8 percent slopes, eroded
Lh	Luverne fine sandy loam, 8 to 20 percent slopes, eroded
Lk	Luverne gravelly fine sandy loam, 1 to 5 percent slopes
Lm	Luverne gravelly fine sandy loam, 5 to 8 percent slopes
Ln	Luverne loamy fine sand, thick surface, 1 to 5 percent slopes
Lo	Luverne loamy fine sand, thick surface, 5 to 8 percent slopes
Lp	Luverne soils, 1 to 20 percent slopes, severely eroded
Ma	Mantachie very fine sandy loam
Mb	McKamie very fine sandy loam, 1 to 5 percent slopes
Mc	McKamie very fine sandy loam, 1 to 5 percent slopes, eroded
Md	McKamie very fine sandy loam, 5 to 8 percent slopes, eroded
Me	McKamie and Hortman soils, 8 to 20 percent slopes
Mg	Miller clay, 0 to 1 percent slopes
Mh	Miller clay, 1 to 3 percent slopes
Mk	Miller clay, 3 to 8 percent slopes
Mm	Miller clay, overflow, 0 to 1 percent slopes
Mn	Miller clay, undulating
Mo	Miller silt loam, 0 to 1 percent slopes
Mp	Miller silt loam, 1 to 3 percent slopes
Mr	Miller silty clay loam, 0 to 1 percent slopes
Ms	Mixed alluvial land
Mt	Mixed wet alluvial land
Mu	Morse clay, 1 to 5 percent slopes, eroded
Mv	Morse clay, 5 to 8 percent slopes, eroded
Mw	Morse clay, 8 to 20 percent slopes, eroded
Mx	Morse clay, 3 to 8 percent slopes, severely eroded
My	Morse clay, dark surface, 1 to 5 percent slopes
Mz	Morse clay, dark surface, 1 to 5 percent slopes, eroded
Maa	Muskogee complex, mounded, 1 to 3 percent slopes
Mab	Muskogee silt loam, 1 to 5 percent slopes
Mac	Muskogee silt loam, 1 to 5 percent slopes, eroded
Mad	Muskogee soils, 1 to 8 percent slopes, severely eroded
Mae	Myatt complex, mounded
Maf	Myatt silt loam
Mag	Myatt-Stough complex, overflow
Na	Nacogdoches gravelly fine sandy loam, 1 to 5 percent slopes, eroded
Nc	Nacogdoches gravelly fine sandy loam, 5 to 8 percent slopes, eroded
Ng	Nacogdoches gravelly fine sandy loam, 8 to 30 percent slopes, eroded
Ns	Nacogdoches soils, 5 to 30 percent slopes, severely eroded
Oc	Ochlockonee and luka sandy loams
Of	Orangeburg fine sandy loam, 1 to 5 percent slopes
Og	Orangeburg fine sandy loam, 1 to 5 percent slopes, eroded
Om	Orangeburg fine sandy loam, 5 to 8 percent slopes
Or	Orangeburg fine sandy loam, 5 to 8 percent slopes, eroded
Ou	Orangeburg and Ruston fine sandy loams, 8 to 20 percent slopes, eroded
Pa	Perry clay
Pb	Perry clay, overflow
Pe	Perry soils, overflow
Ph	Pheba complex, mounded, 0 to 3 percent slopes
Pk	Pheba very fine sandy loam, 0 to 3 percent slopes
Pm	Prentiss complex, mounded, 0 to 1 percent slopes
Pn	Prentiss complex, mounded, 1 to 5 percent slopes
Po	Prentiss very fine sandy loam, 0 to 1 percent slopes
Pp	Prentiss very fine sandy loam, clay substratum, 0 to 1 percent slopes
Pr	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes
Ps	Prentiss very fine sandy loam, clay substratum, 1 to 5 percent slopes, eroded
Pt	Prentiss and Stough silt loams, clay substrata, 0 to 1 percent slopes
Pv	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes
Pw	Prentiss and Tilden very fine sandy loams, 1 to 5 percent slopes, eroded
Ra	Riverwash

SYMBOL	NAME
Rb	Roebuck clay, 0 to 1 percent slopes
Rc	Roebuck clay, 1 to 3 percent slopes
Rd	Roebuck clay, overflow, 0 to 1 percent slopes
Re	Roebuck clay, undulating
Rf	Roebuck silt loam, 0 to 1 percent slopes
Rg	Ruston fine sandy loam, 1 to 5 percent slopes
Rh	Ruston fine sandy loam, 1 to 5 percent slopes, eroded
Rk	Ruston fine sandy loam, 5 to 8 percent slopes
Rm	Ruston fine sandy loam, 5 to 8 percent slopes, eroded
Rn	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes
Ro	Ruston fine sandy loam, hard substratum, 1 to 5 percent slopes, eroded
Rs	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes
Rt	Ruston fine sandy loam, hard substratum, 5 to 8 percent slopes, eroded
Ru	Ruston soils, 1 to 8 percent slopes, severely eroded
Sa	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes
Sb	Savannah and Bowie very fine sandy loams, 1 to 5 percent slopes, eroded
Sc	Sawyer fine sandy loam, 1 to 5 percent slopes
Sd	Sawyer fine sandy loam, 1 to 5 percent slopes, eroded
Se	Shubuta fine sandy loam, 1 to 5 percent slopes
Sf	Shubuta fine sandy loam, 1 to 5 percent slopes, eroded
Sg	Shubuta fine sandy loam, 5 to 8 percent slopes
Sh	Shubuta fine sandy loam, 5 to 8 percent slopes, eroded
Sk	Shubuta fine sandy loam, 8 to 16 percent slopes, eroded
Sm	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes
Sn	Shubuta gravelly fine sandy loam, 1 to 5 percent slopes, eroded
So	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes
Sp	Shubuta gravelly fine sandy loam, 5 to 8 percent slopes, eroded
Sr	Shubuta gravelly fine sandy loam, 8 to 20 percent slopes
Ss	Shubuta soils, 5 to 30 percent slopes, severely eroded
St	Shubuta-Boswell gravelly sandy loams, 8 to 30 percent slopes, eroded
Su	Shubuta and Cuthbert gravelly sandy loams, 8 to 30 percent slopes
Sv	Stough complex, mounded, 0 to 1 percent slopes
Sw	Stough silt loam, 0 to 3 percent slopes
Sx	Stough silt loam, clay substratum, 0 to 1 percent slopes
Sy	Stough silt loam, clay substratum, 1 to 3 percent slopes
Sz	Susquehanna fine sandy loam, 1 to 8 percent slopes
Saa	Susquehanna soils, 8 to 30 percent slopes, eroded
Sab	Susquehanna soils, 5 to 30 percent slopes, severely eroded
Td	Tilden soils, 1 to 8 percent slopes, severely eroded
Tf	Tilden very fine sandy loam, 0 to 1 percent slopes
Ts	Tilden very fine sandy loam, 1 to 5 percent slopes
Tv	Tilden very fine sandy loam, 1 to 5 percent slopes, eroded
Va	Vaucluse loamy fine sand, 1 to 5 percent slopes
Vc	Vaucluse loamy fine sand, 1 to 5 percent slopes, eroded
Vf	Vaucluse loamy fine sand, 5 to 8 percent slopes
Vm	Vaucluse loamy fine sand, 5 to 8 percent slopes, eroded
Vs	Vaucluse loamy fine sand, 8 to 16 percent slopes, eroded
Wr	Wrightsville complex, mounded
Wt	Wrightsville silt loam
Wv	Wrightsville silty clay
Ya	Yahola clay, overwash, 0 to 1 percent slopes
Yc	Yahola clay, overwash, 1 to 3 percent slopes
Yh	Yahola silt loam, 0 to 1 percent slopes
Ym	Yahola silt loam, 1 to 3 percent slopes
Yn	Yahola silty clay loam, 0 to 1 percent slopes
Yo	Yahola silty clay loam, 1 to 3 percent slopes
Yp	Yahola soils, overflow, 0 to 3 percent slopes
Yr	Yahola very fine sandy loam, 0 to 1 percent slopes
Ys	Yahola very fine sandy loam, 1 to 3 percent slopes
Yt	Yahola very fine sandy loam, 3 to 8 percent slopes
Yv	Yahola very fine sandy loam, undulating

Soil map constructed 1960 by Cartographic Division, Soil Conservation Service, USDA, from 1955 aerial photographs. Controlled mosaic based on Louisiana plane coordinate system, north zone, Lambert conformal conic projection, 1927 North American datum.

BOSSIER PARISH, LOUISIANA
CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferries
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mines and Quarries

Mine dump

Pits, gravel or other

Power lines

Pipe lines

Cemeteries

Dams

Levees

Tanks

Oil wells

Cotton gin

Forest fire or lookout station

BOUNDARIES

National or state

Parish

Township, U. S.

Section line, corner

Reservation

Land grant

DRAINAGE

Streams
- Perennial
- Intermittent, unclass.

Canals and ditches — CANAL DITCH

Lakes and ponds
- Perennial
- Intermittent

Wells — flowing

Springs

Marsh

Wet spot

RELIEF

Escarpments
- Bedrock
- Other

Prominent peaks

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

Soil boundary and symbol — Dx

Gravel

Stones

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

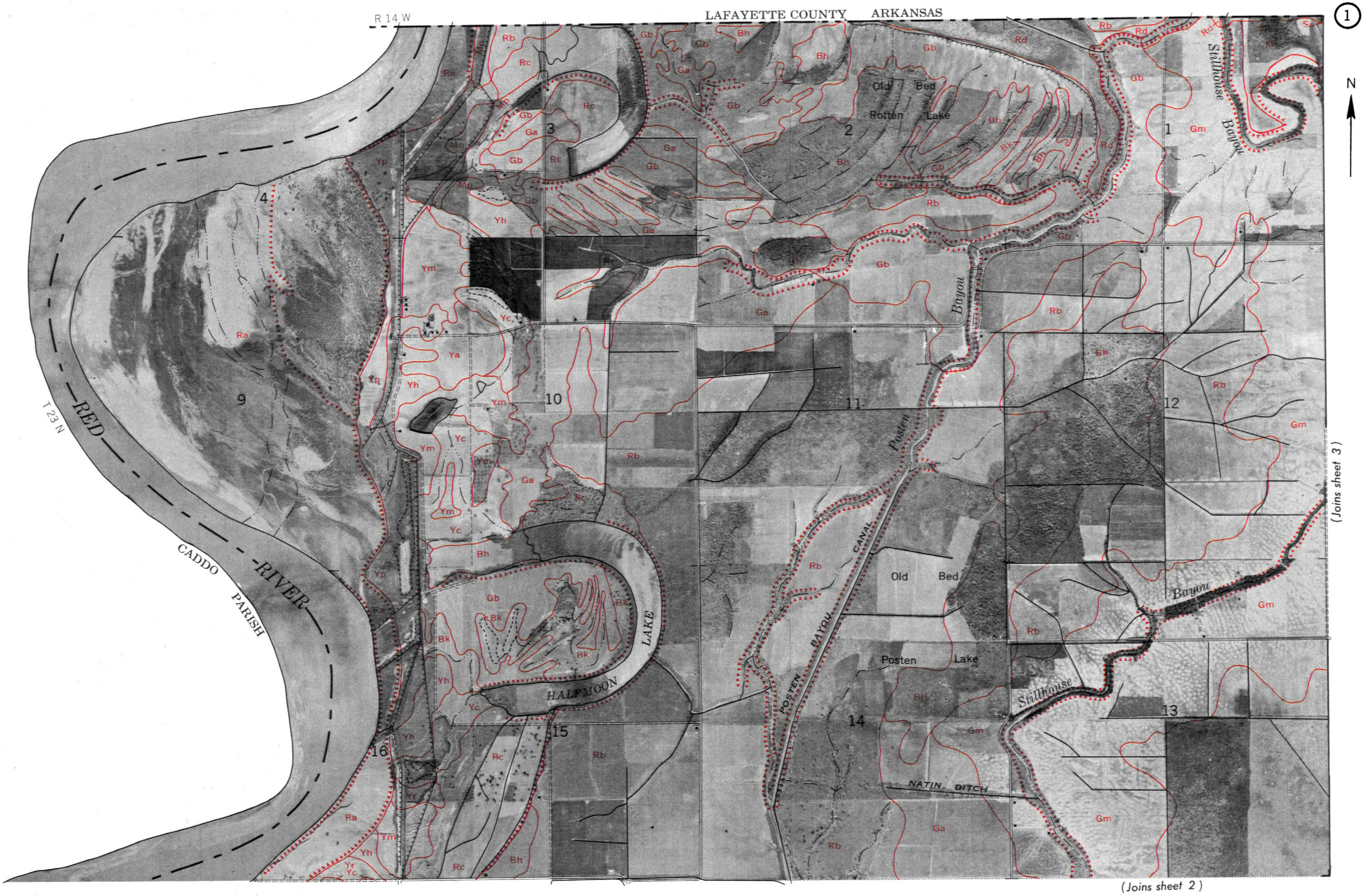
Made land

Severely eroded spot

Blowout, wind erosion

Gullies

BOSSIER PARISH, LOUISIANA – SHEET NUMBER 1



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BOSSIER PARISH, LOUISIANA — SHEET NUMBER 2

②

N

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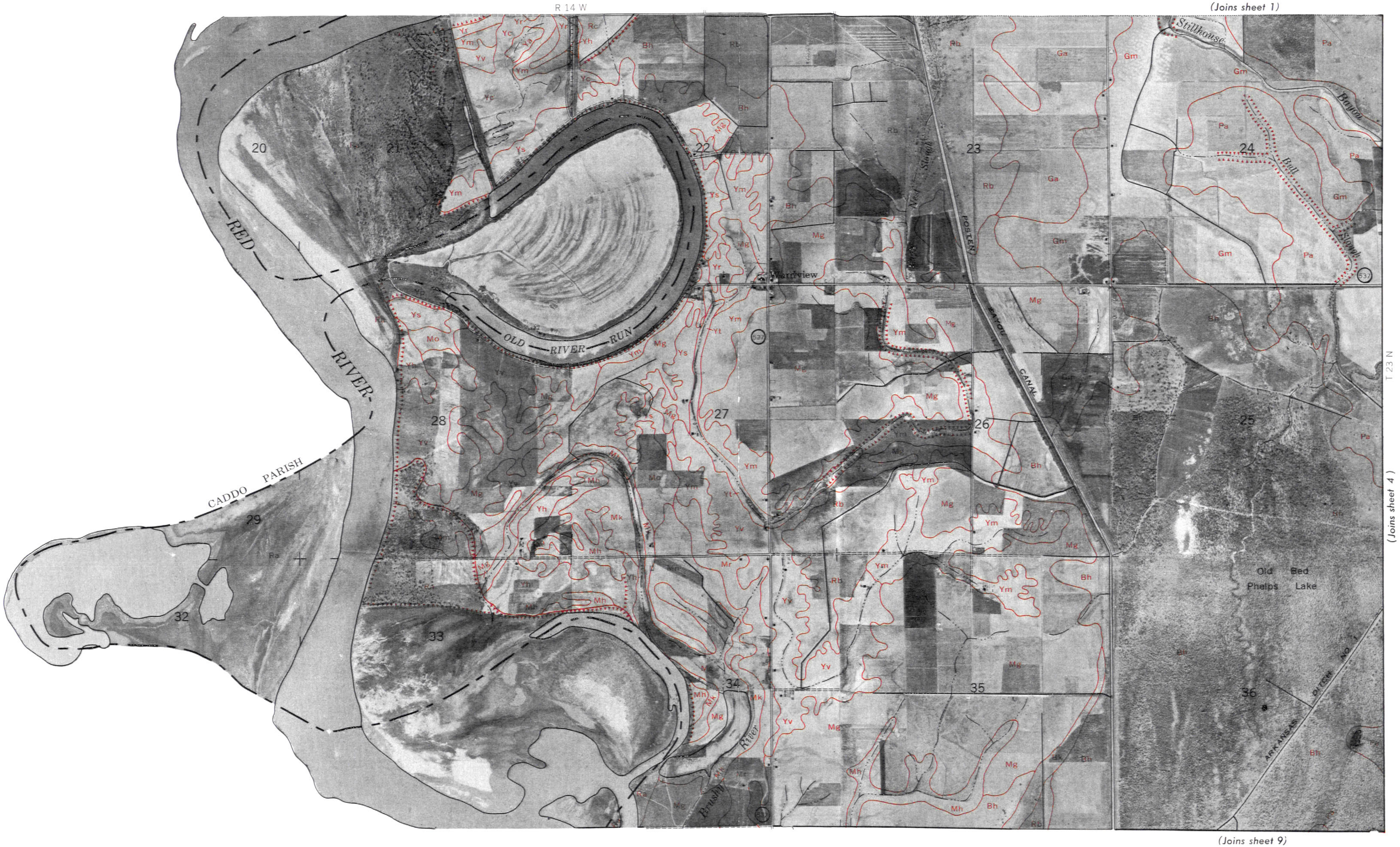

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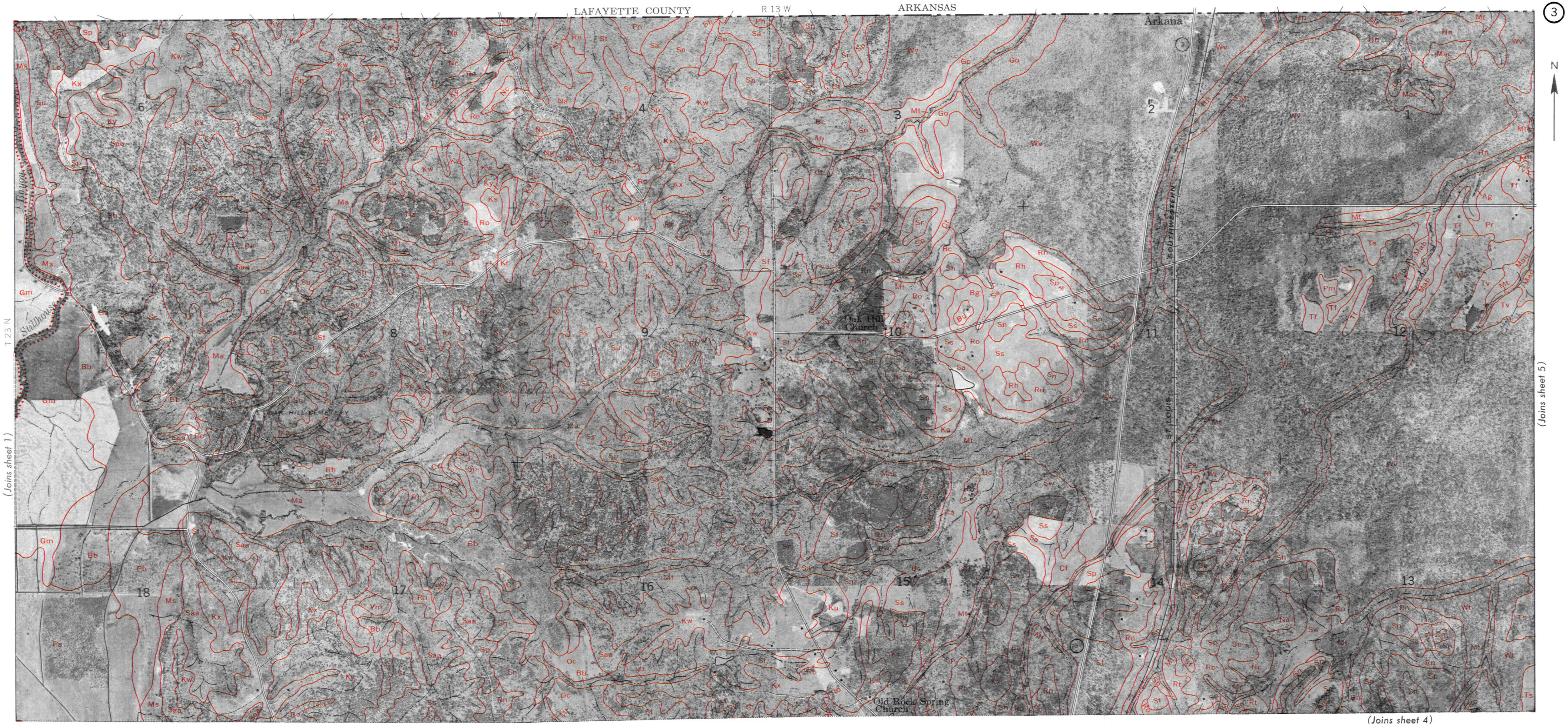

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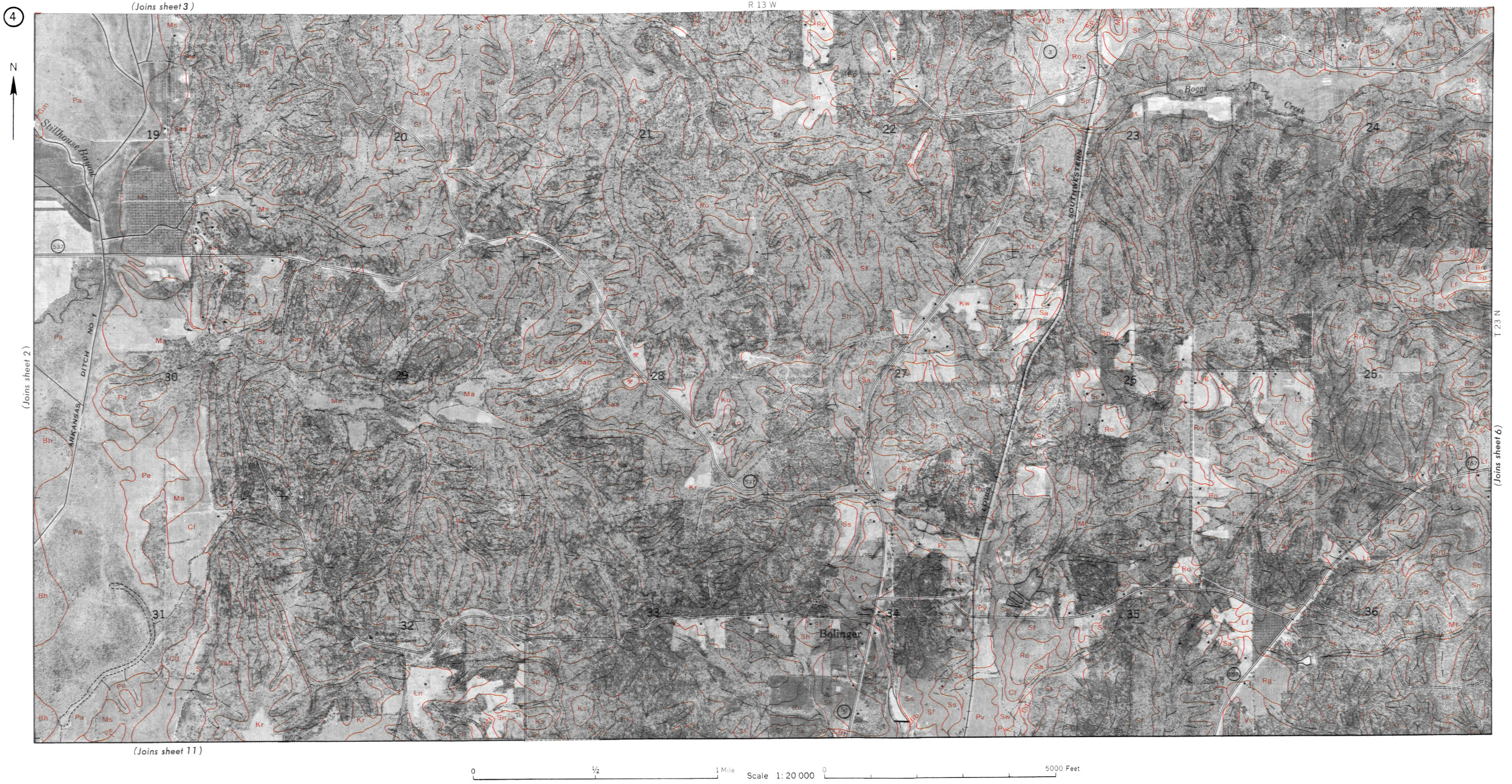
4
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R 13 W
N
(Joins sheet 2)
(Joins sheet 6)
(Joins sheet 11)
T 23 N
Stillhouse Bayou
ARKANSAS DITCH NO 1
Boggs Creek
SOUTHWESTERN
ST LOUIS
Bolinger
19
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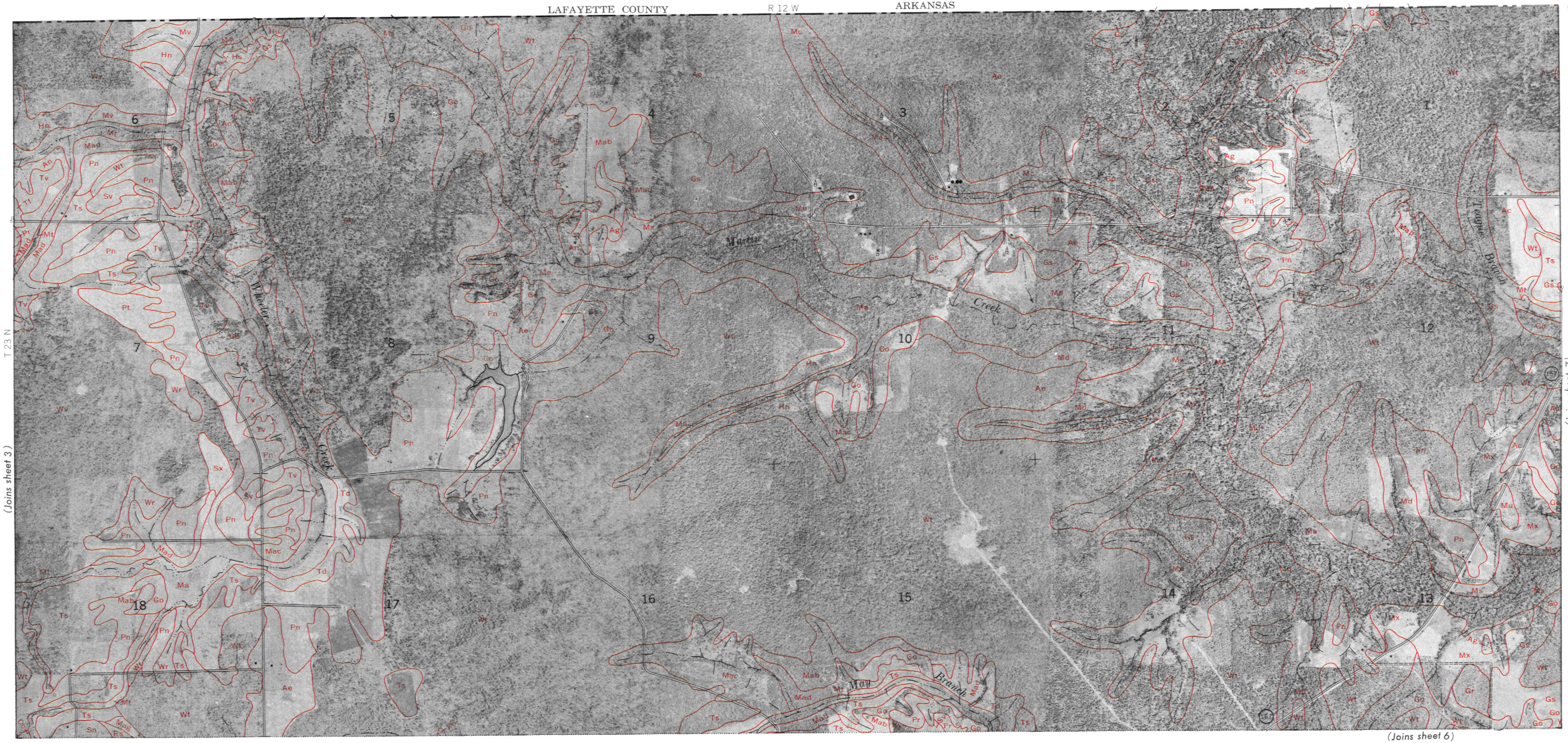
1 Mile
Scale 1:20 000
0
5000 Feet

BOSSIER PARISH, LOUISIANA - SHEET NUMBER 5



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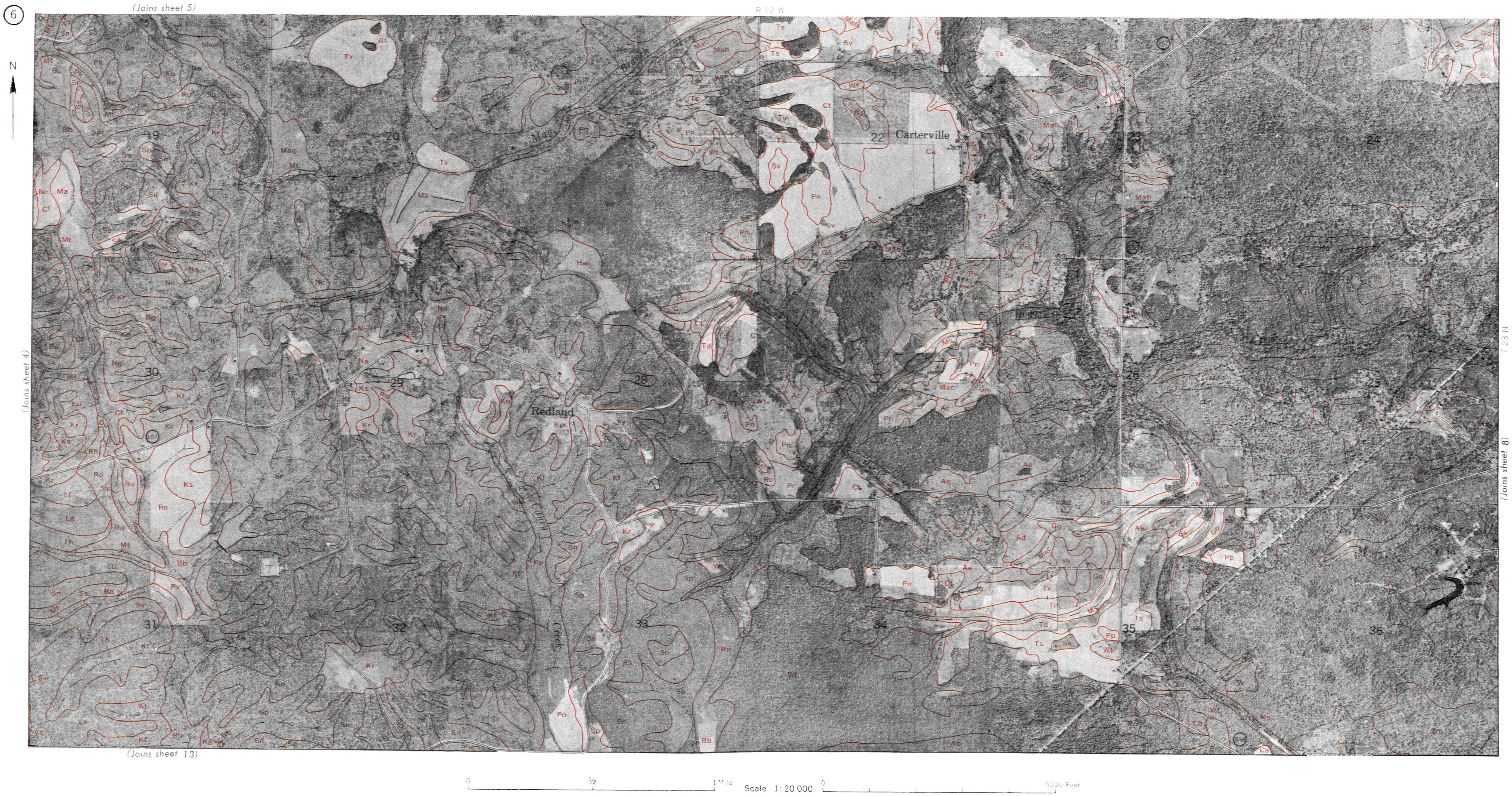
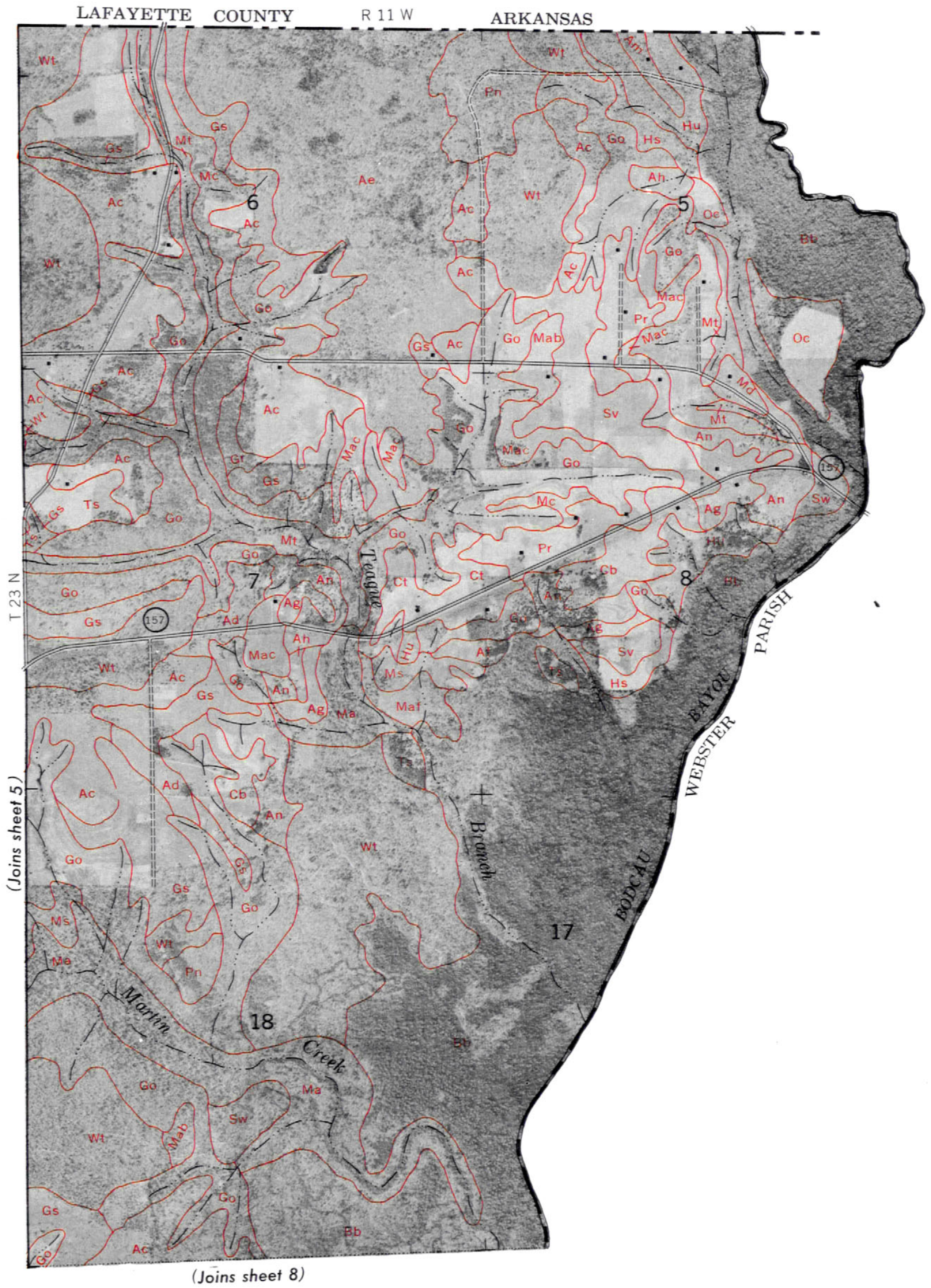


BOSSIER PARISH, LOUISIANA–SHEET NUMBER 7

⑦



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0 ½ 1 Mile Scale 1: 20 000 0 5000 Feet

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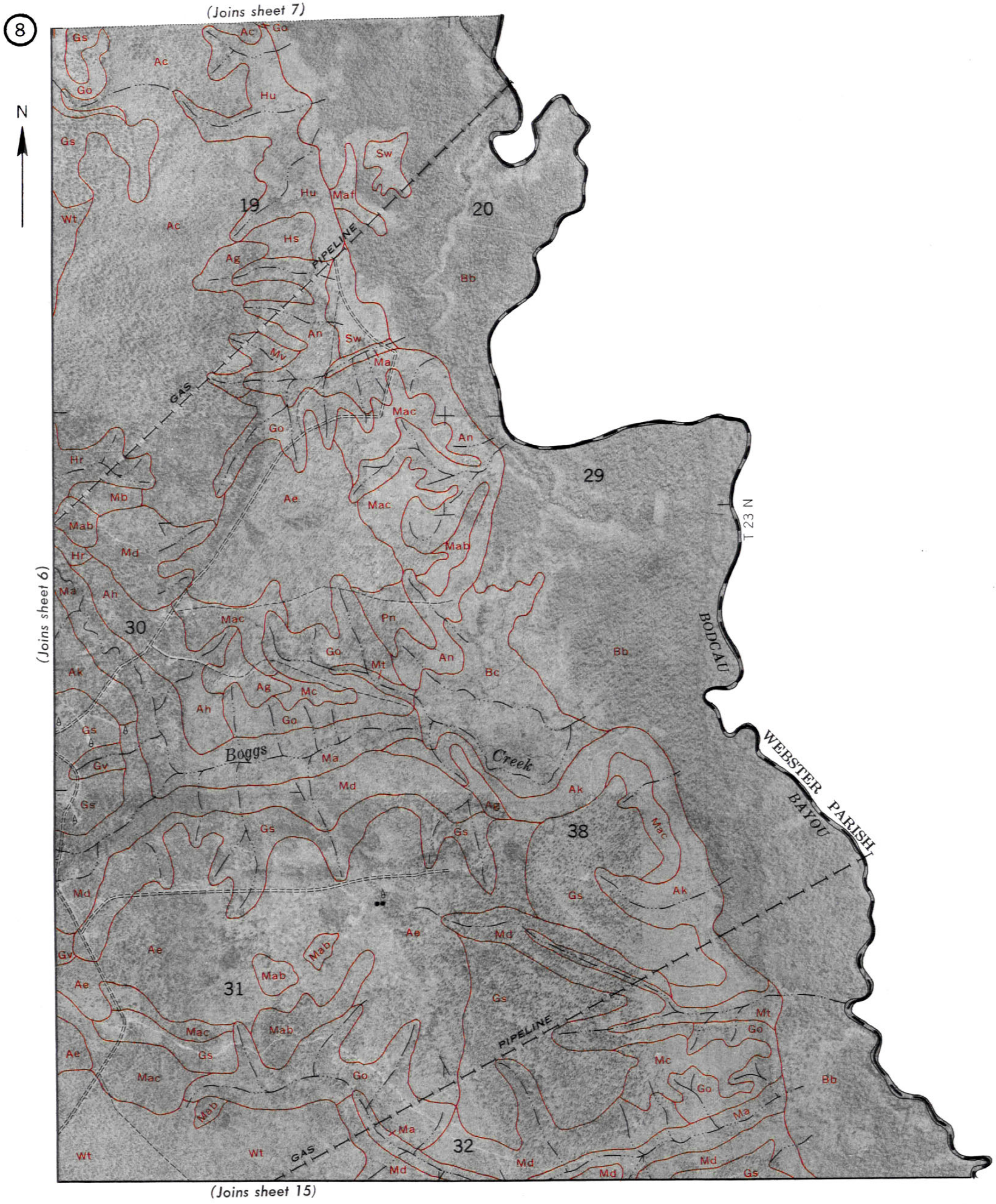

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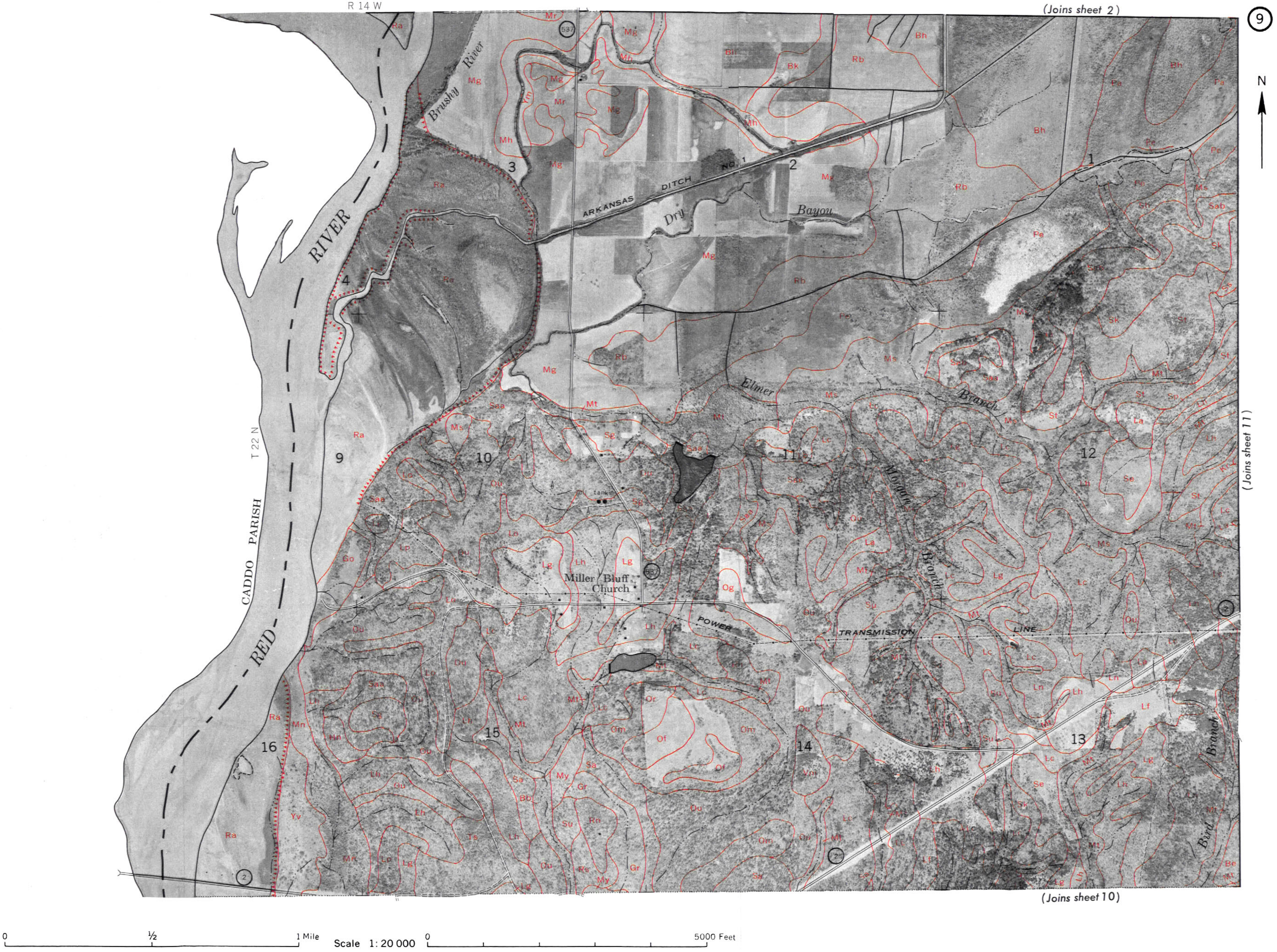

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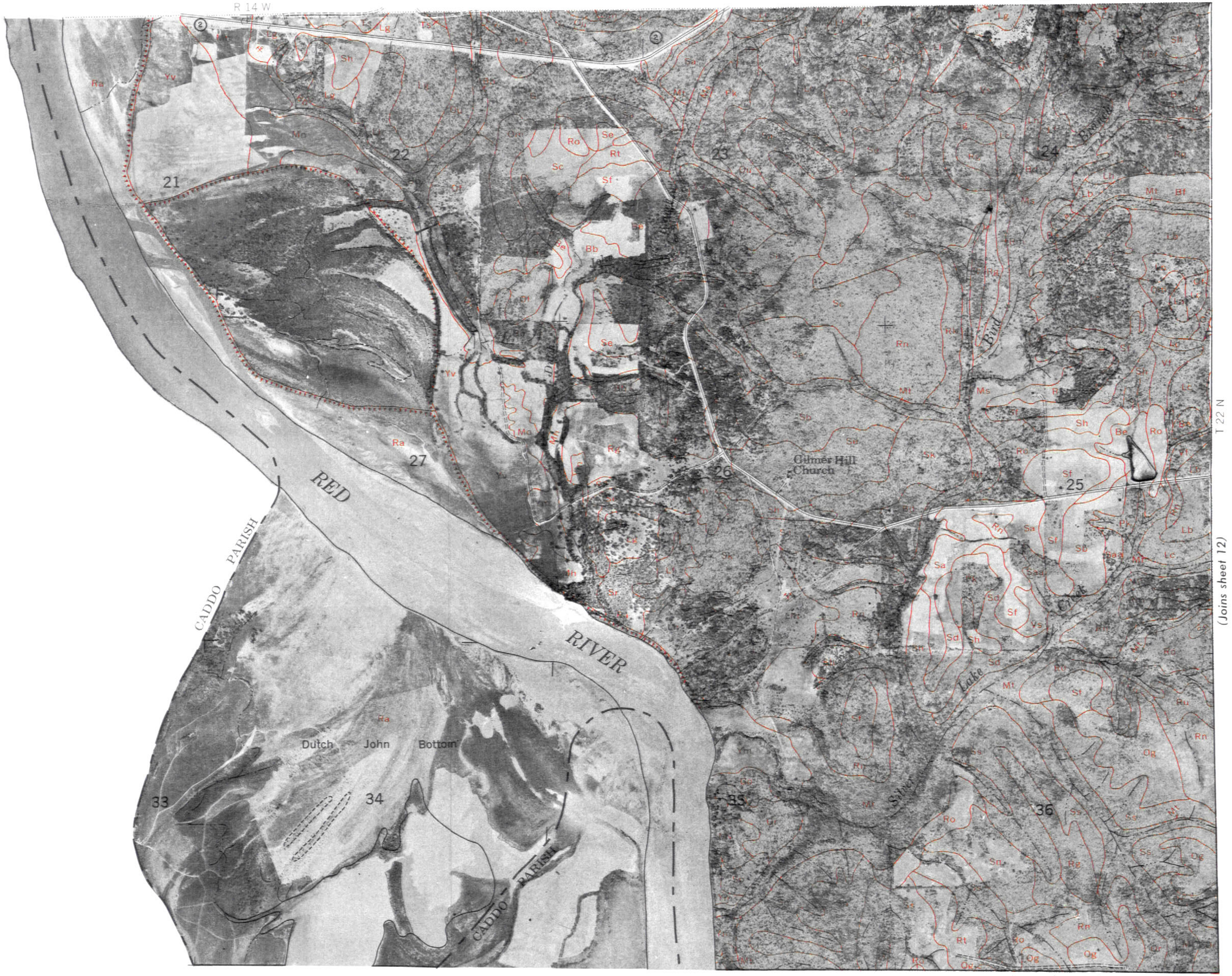

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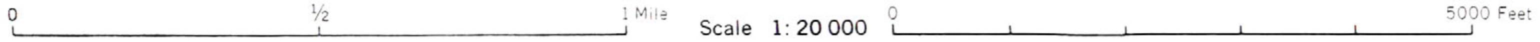

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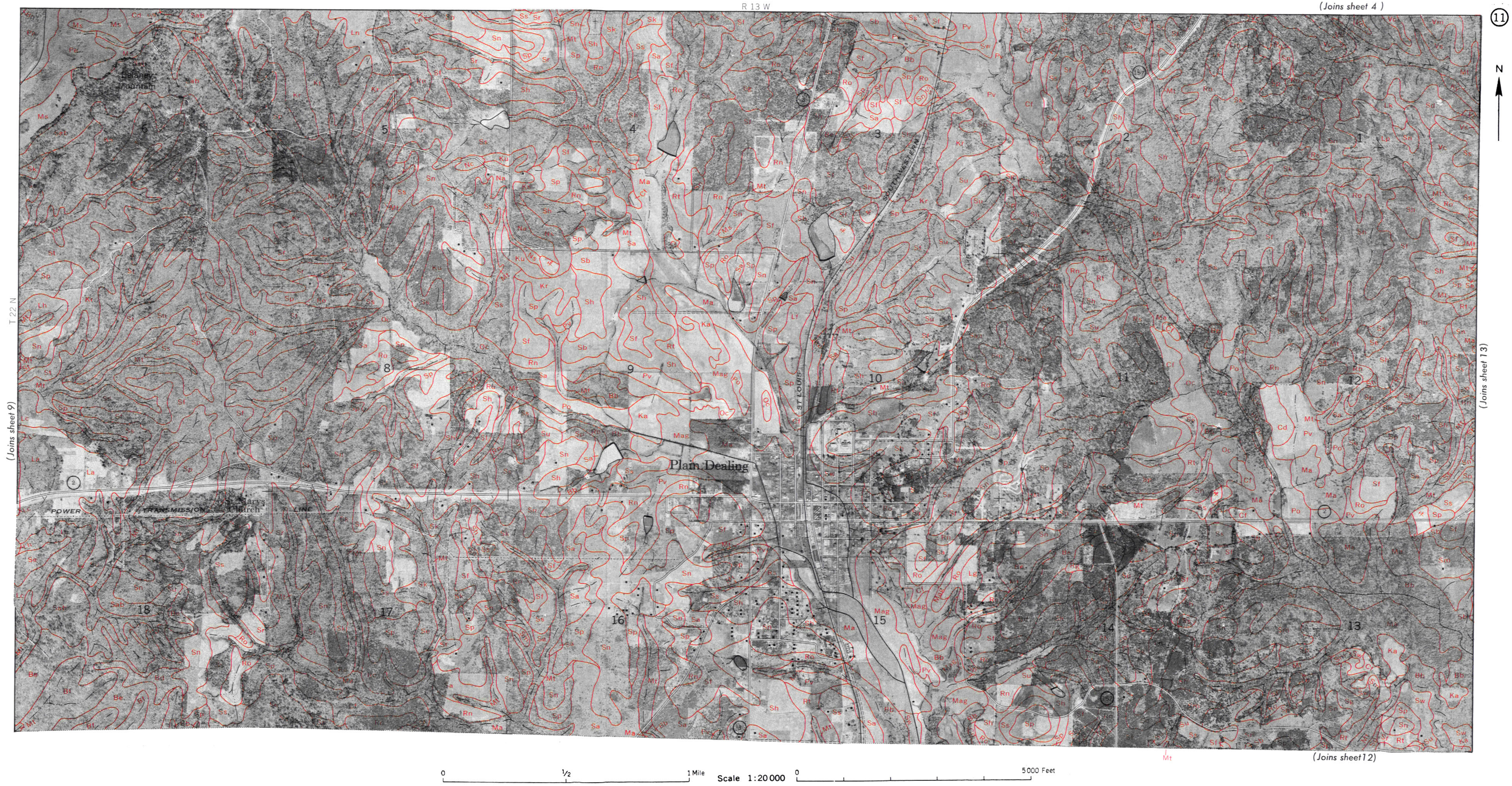

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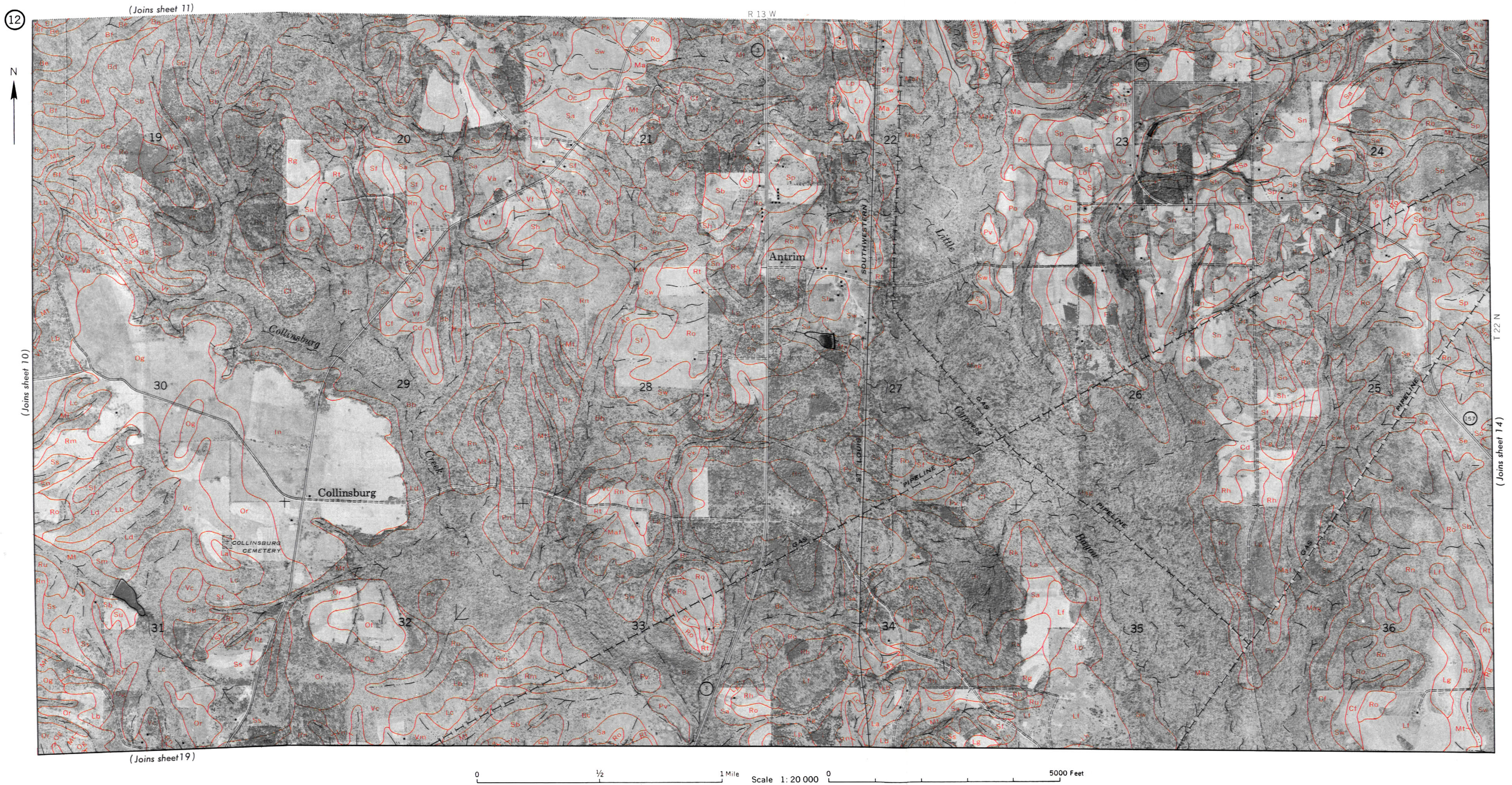

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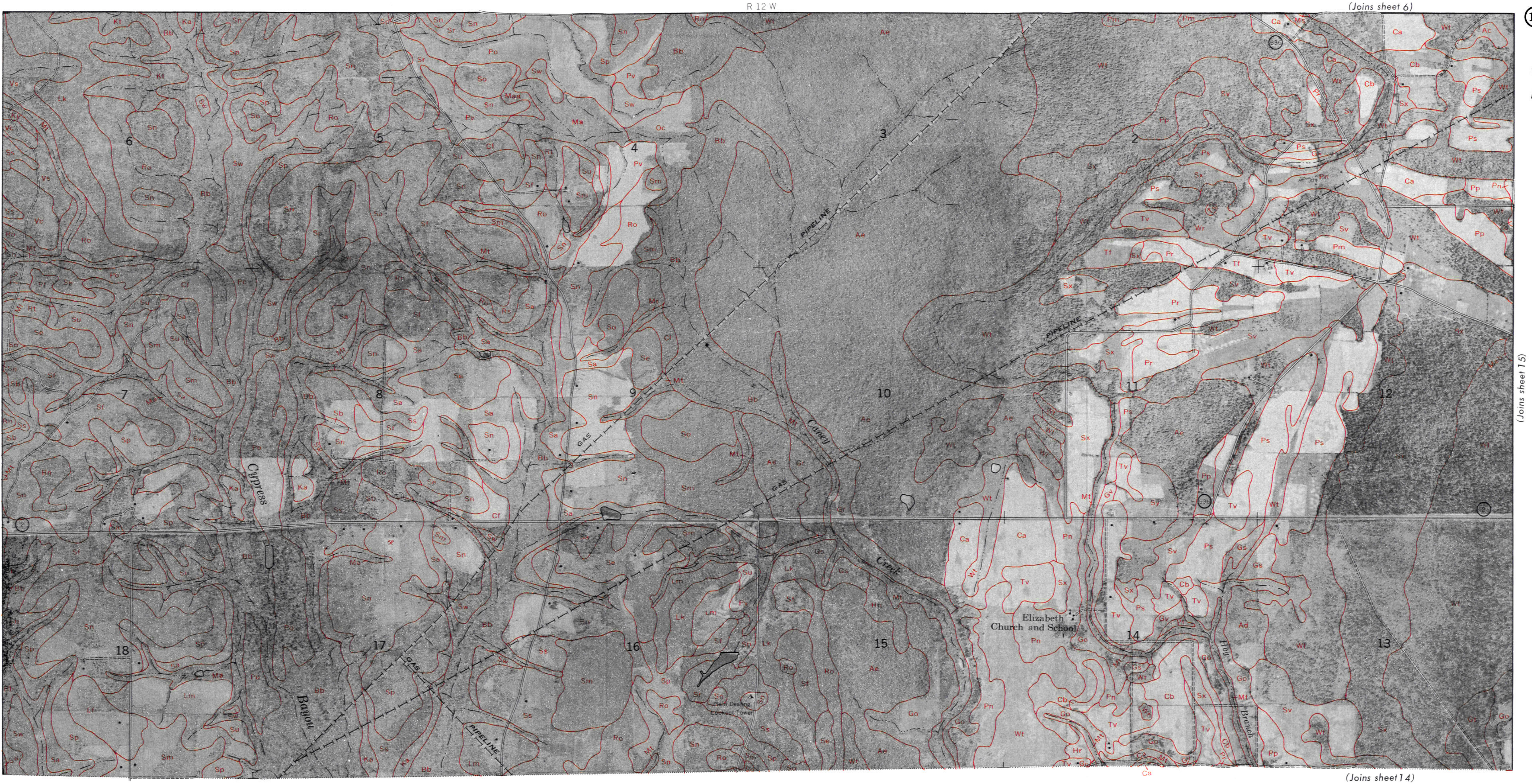

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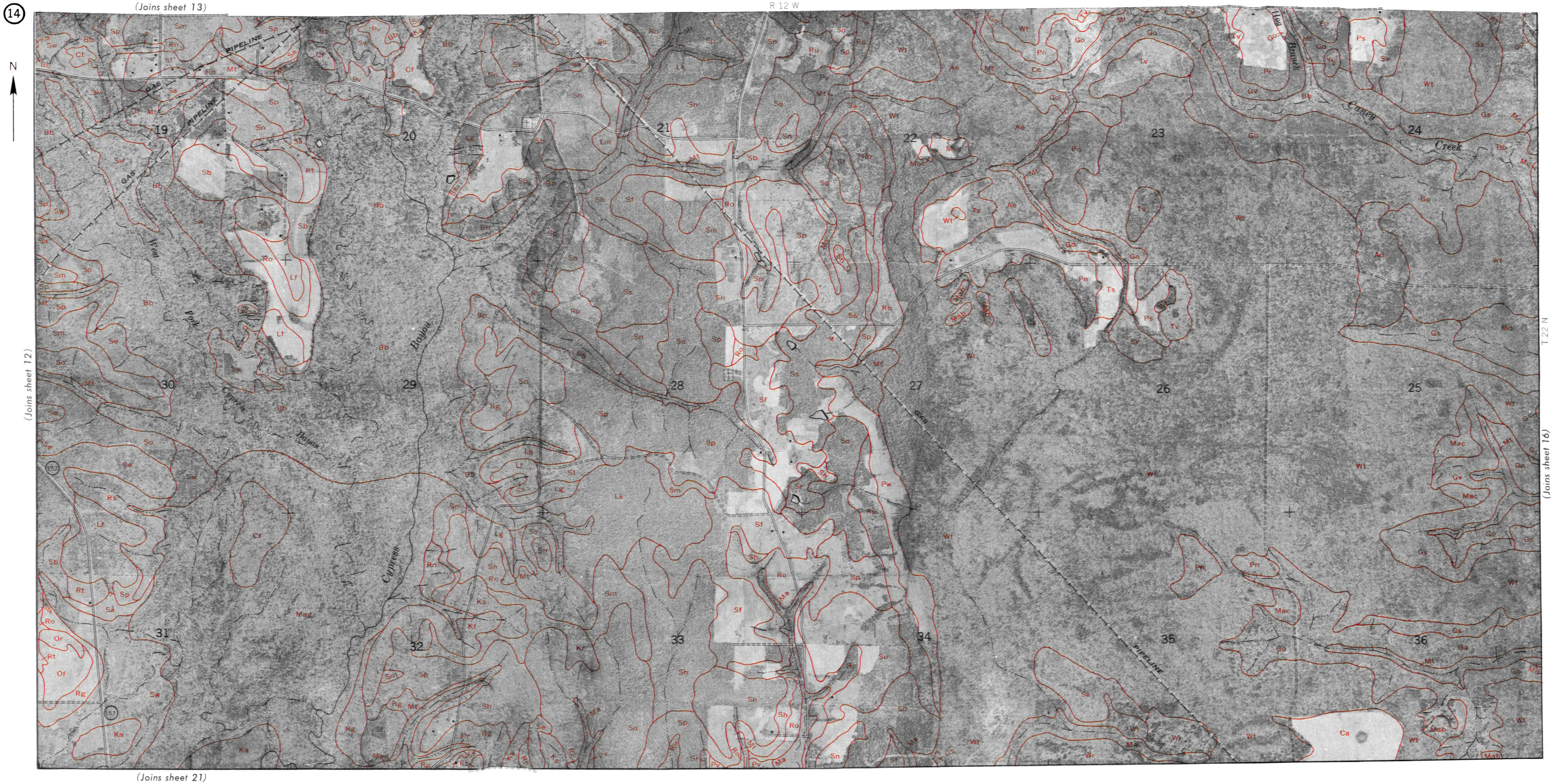

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Scale 1: 20 000
0 5000 Feet

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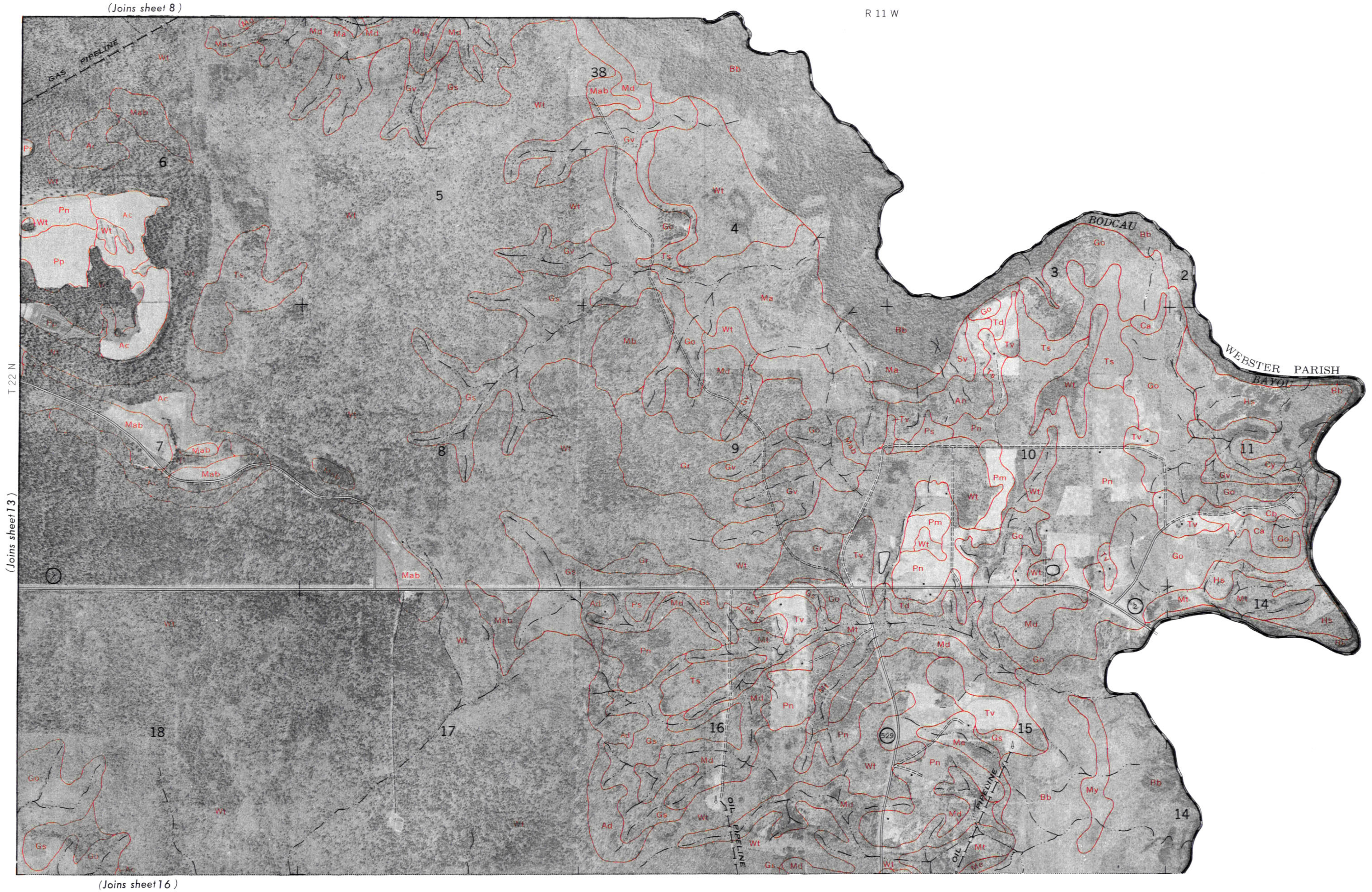

Scale 1: 20 000

0 ½ 1 Mile

0 5000 Feet

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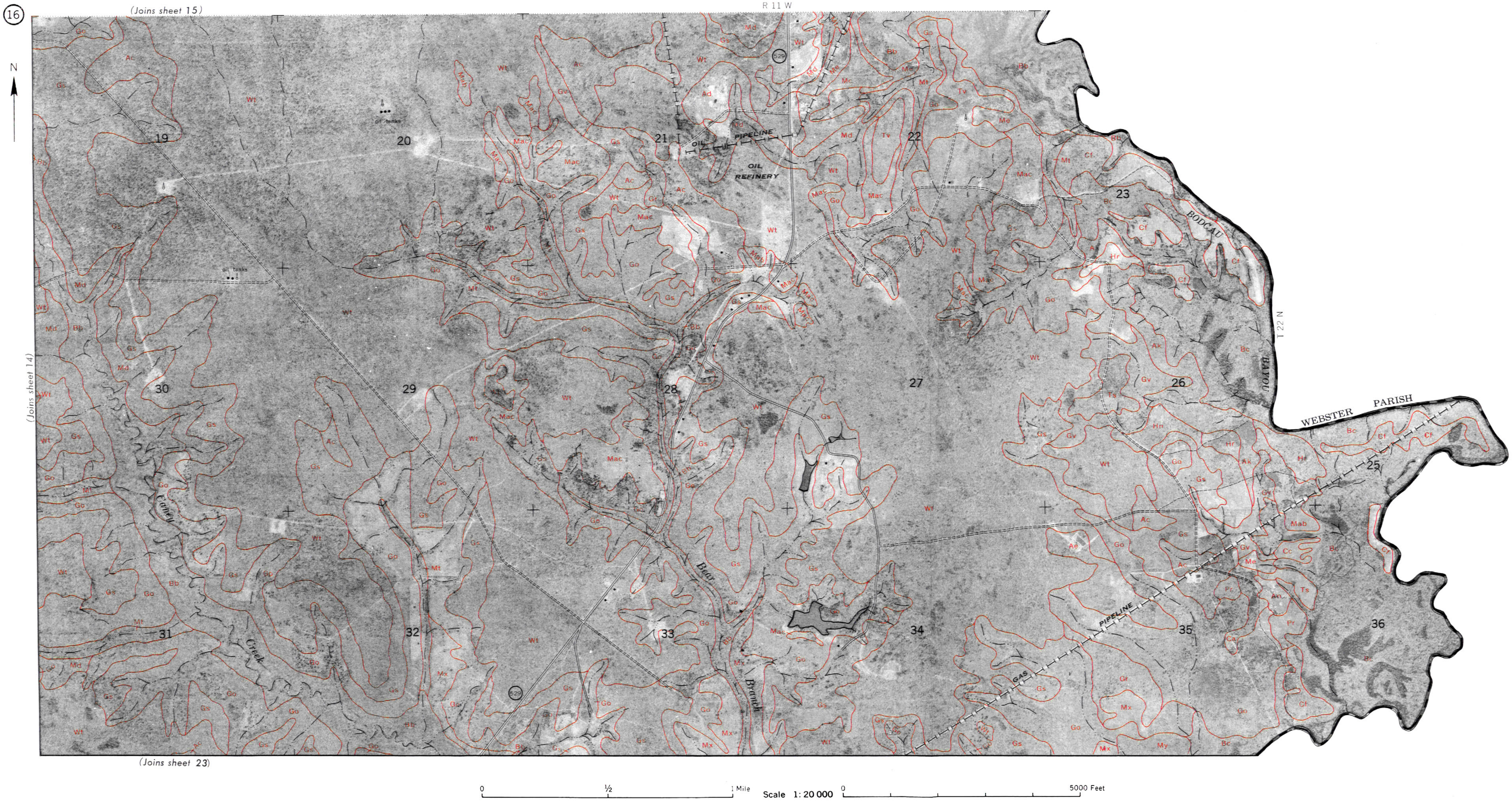

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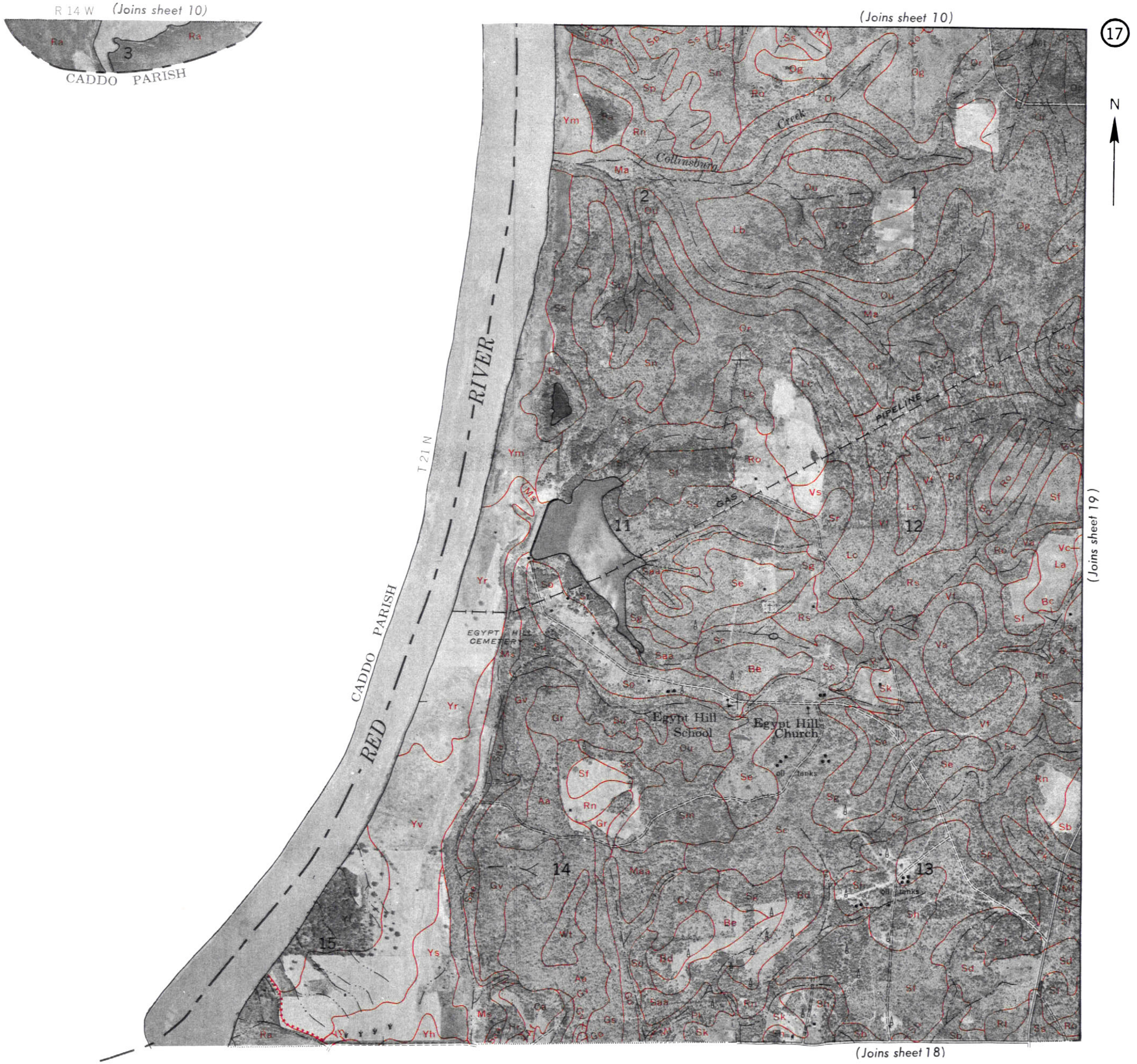


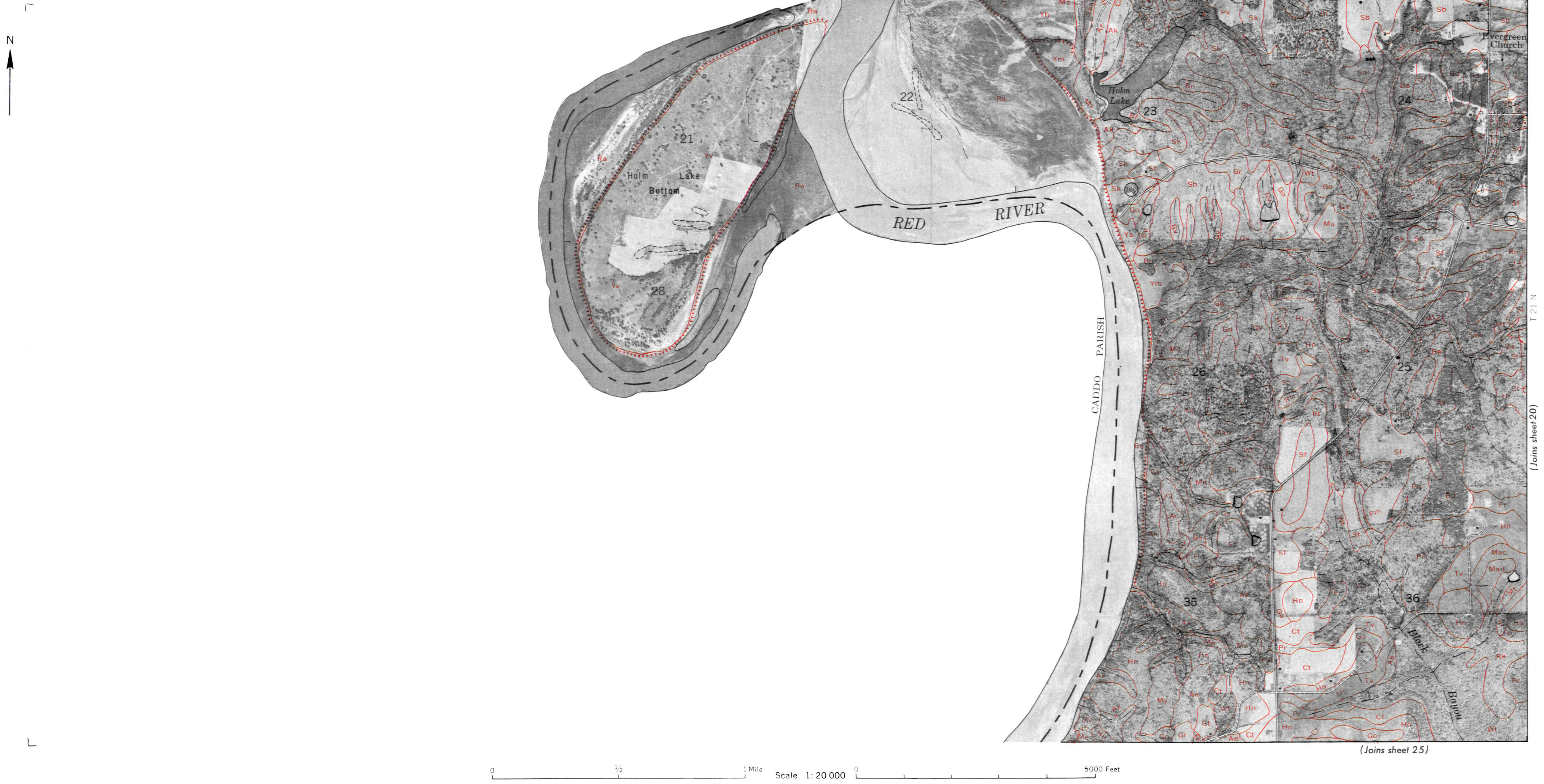
0 ½ 1 Mile

Scale 1: 20 000

0 5000 Feet

(18)

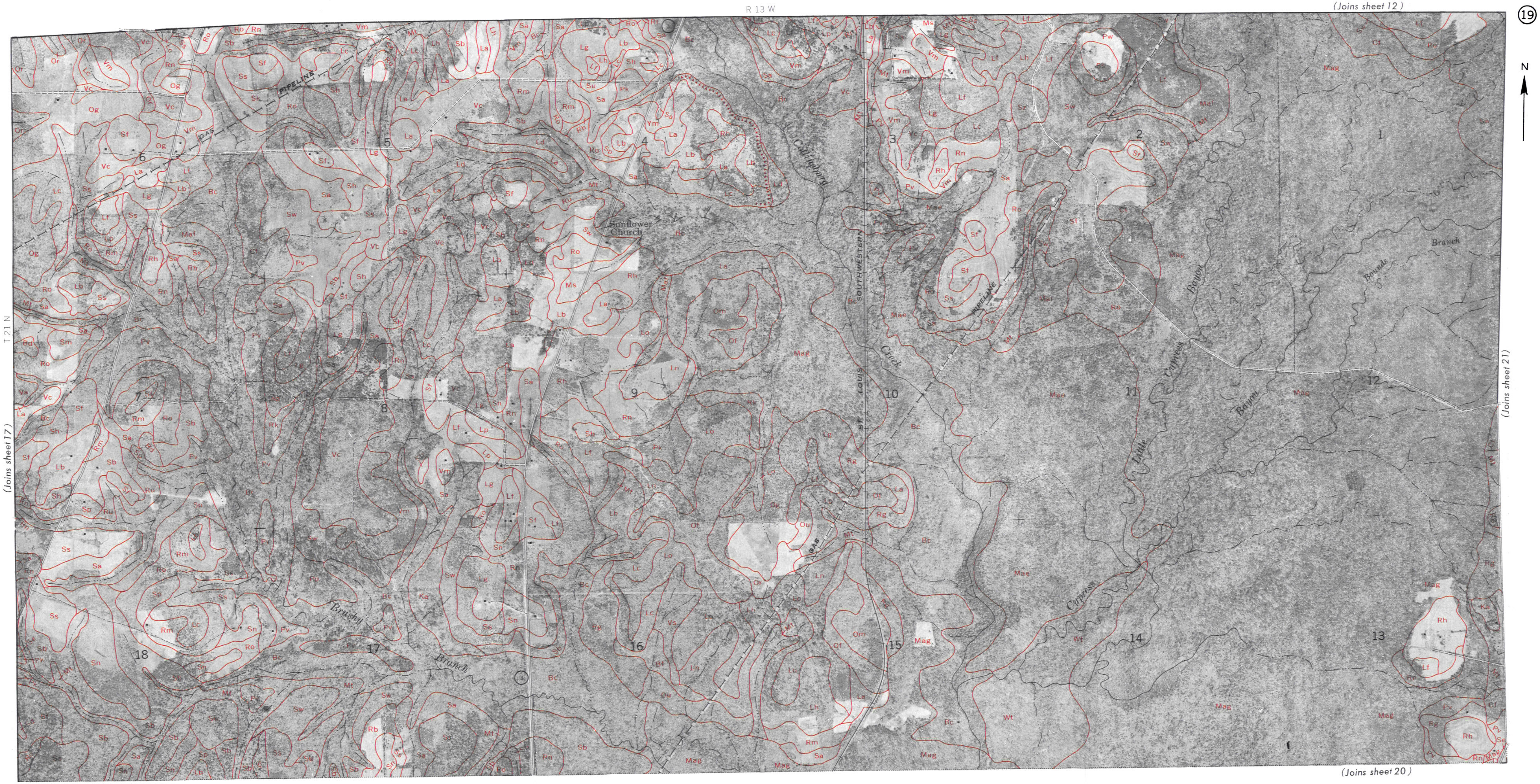
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 18



BOSSIER PARISH, LOUISIANA—SHEET NUMBER 19

⑲

(Joins sheet 12)



(Joins sheet 17)

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(Joins sheet 20)

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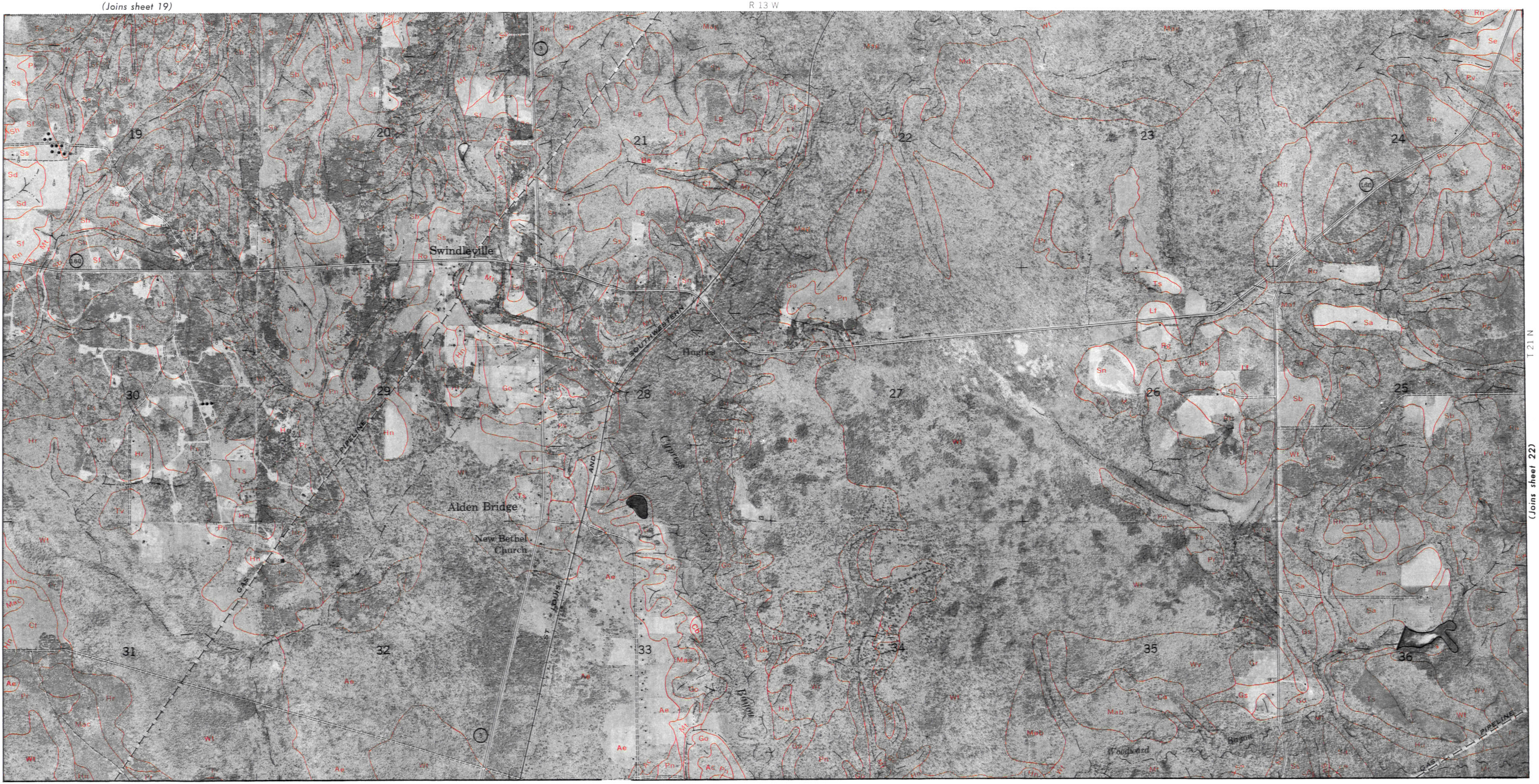
Scale 1:20 000

0 5000 Feet

BOSSIER PARISH, LOUISIANA—SHEET NUMBER 20

⑳

(Joins sheet 19)



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(Joins sheet 22)

(Joins sheet 27)

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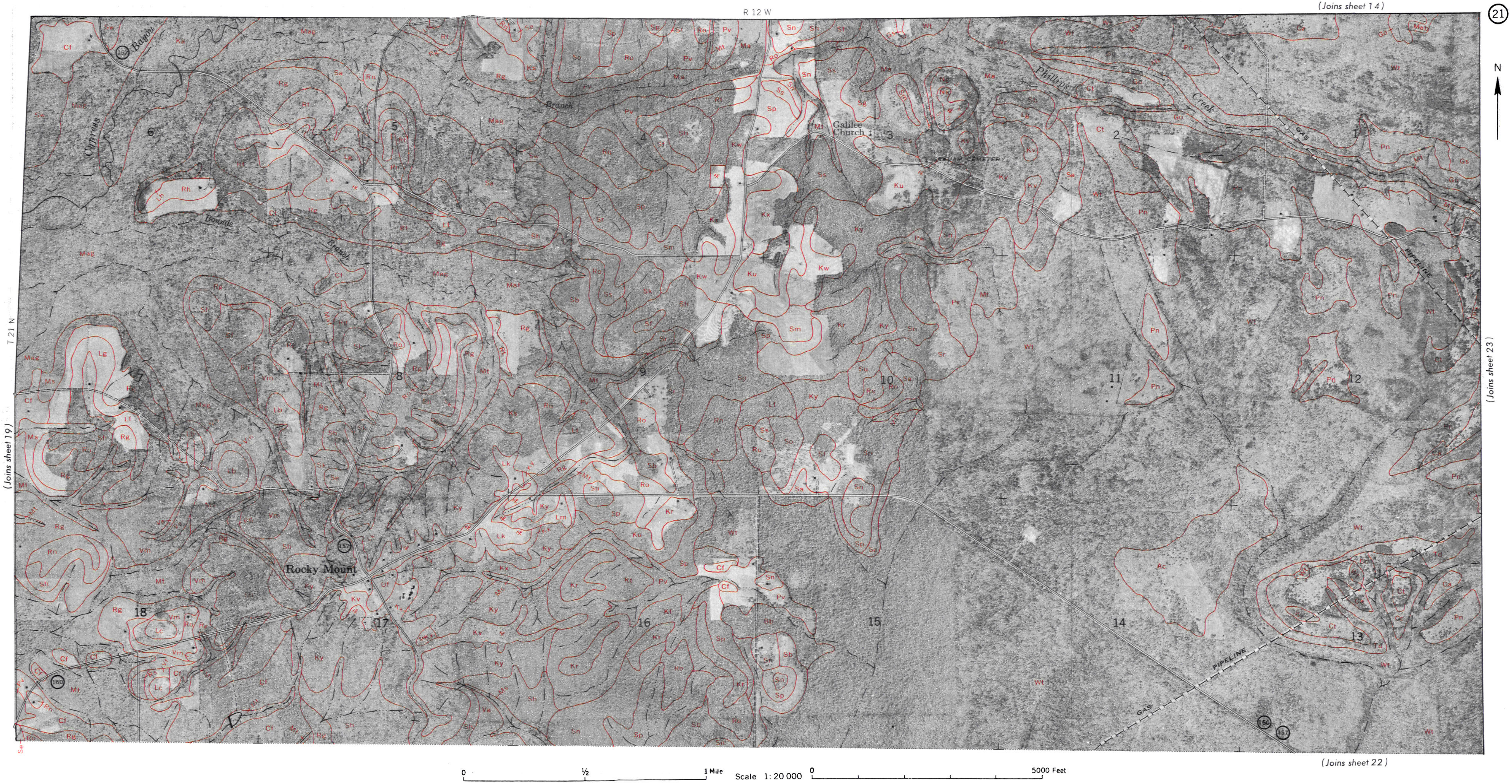
BOSSIER PARISH, LOUISIANA—SHEET NUMBER 21



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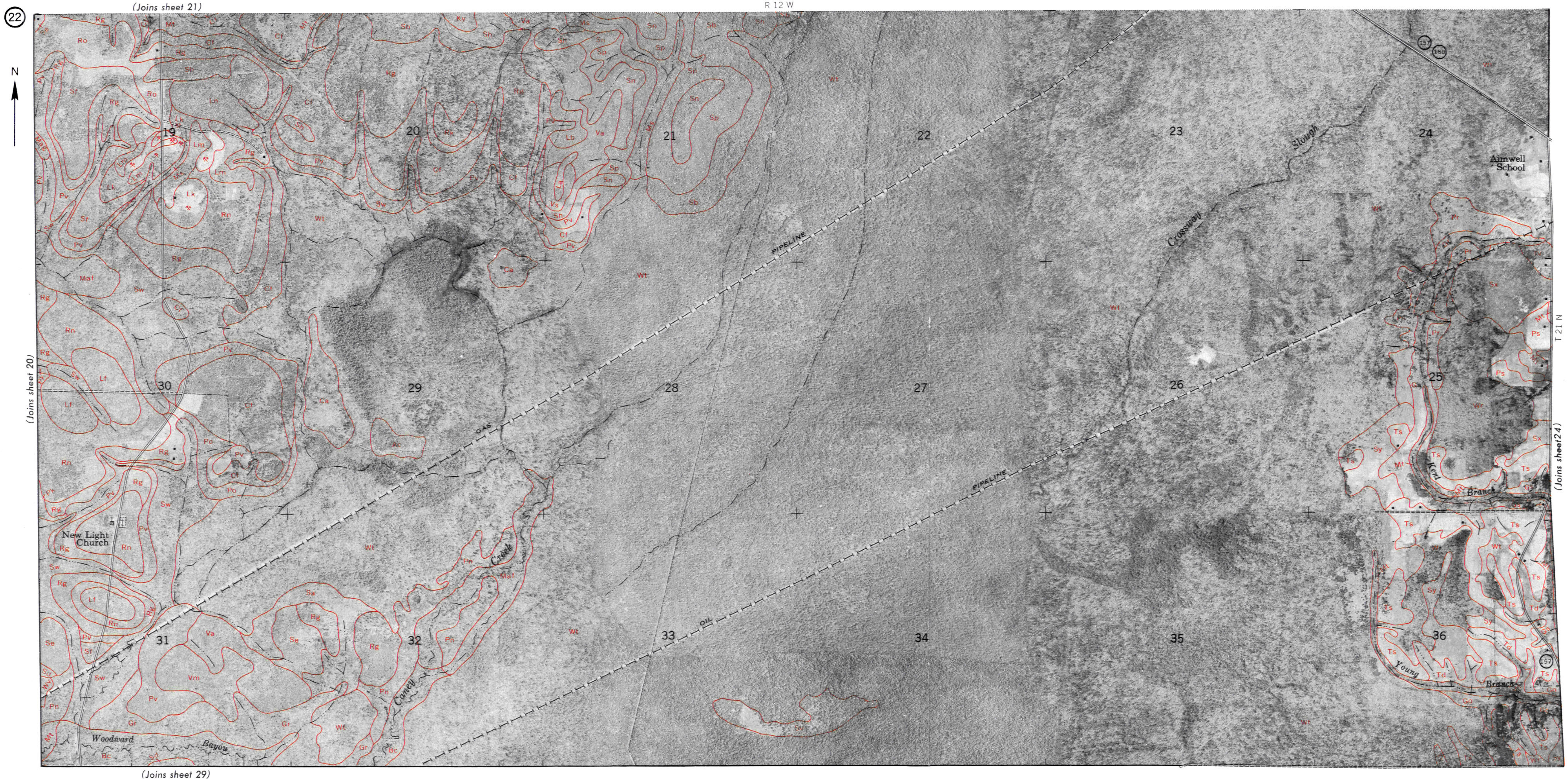

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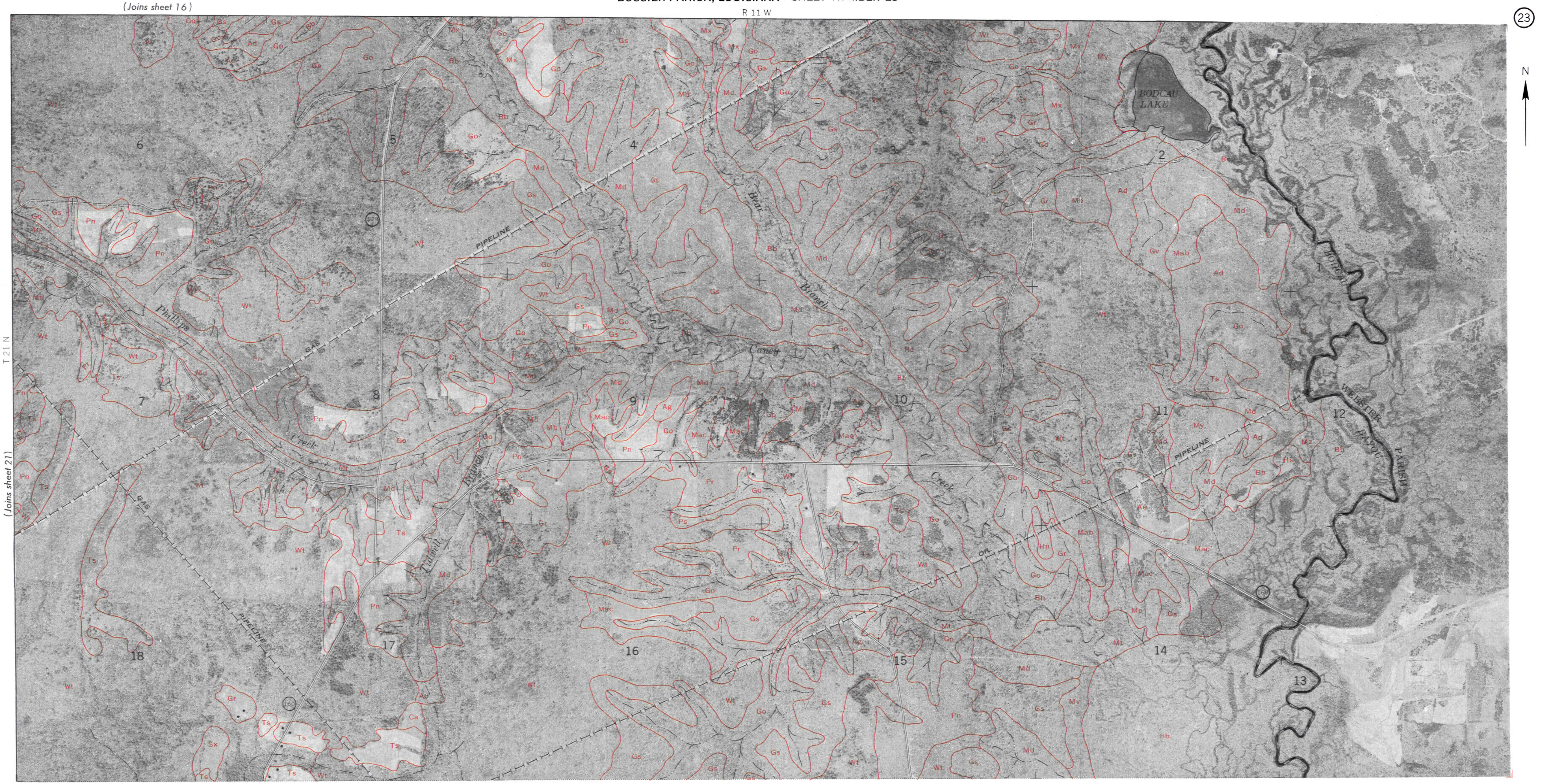
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 23

(Joins sheet 16)



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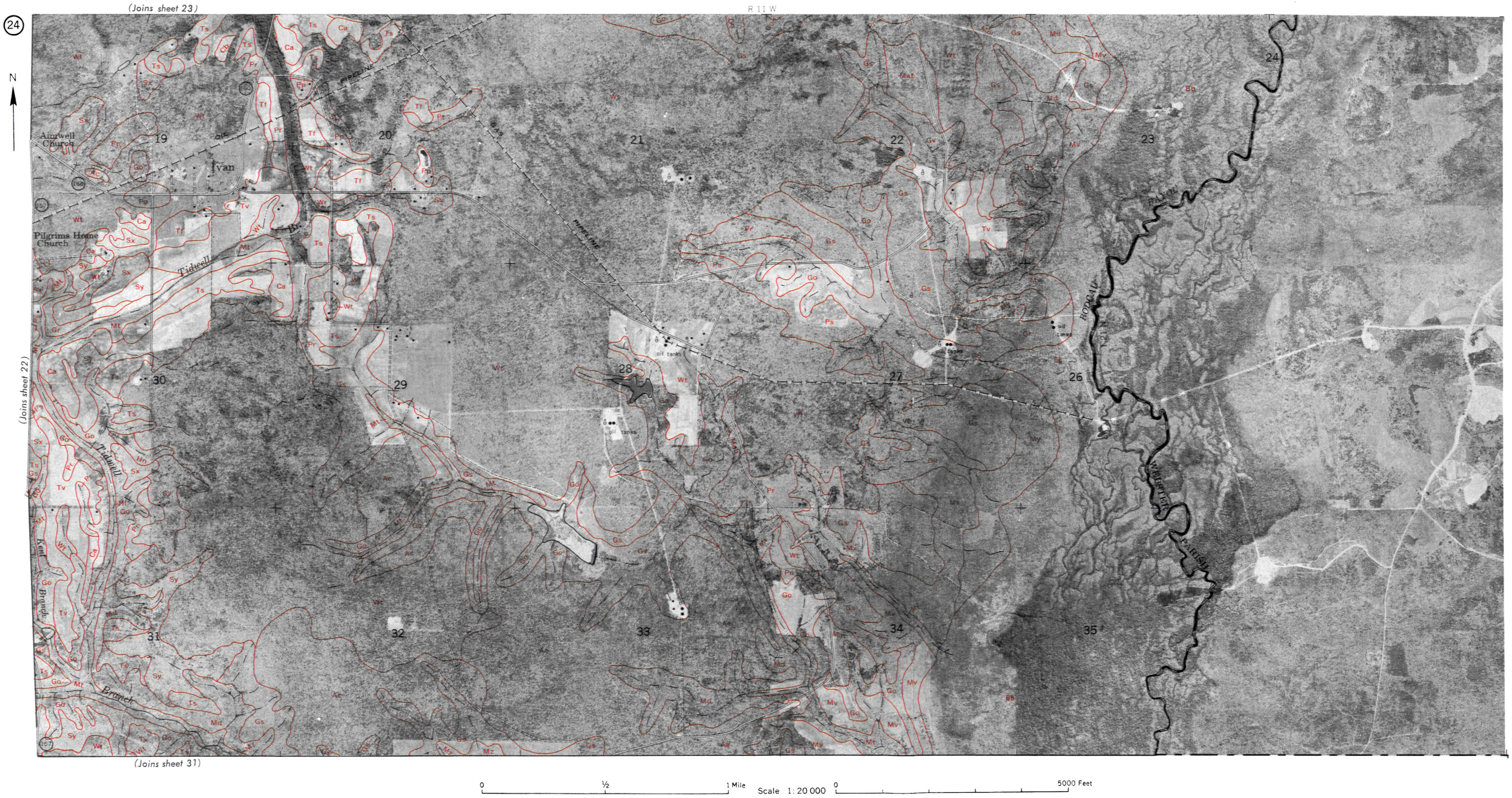
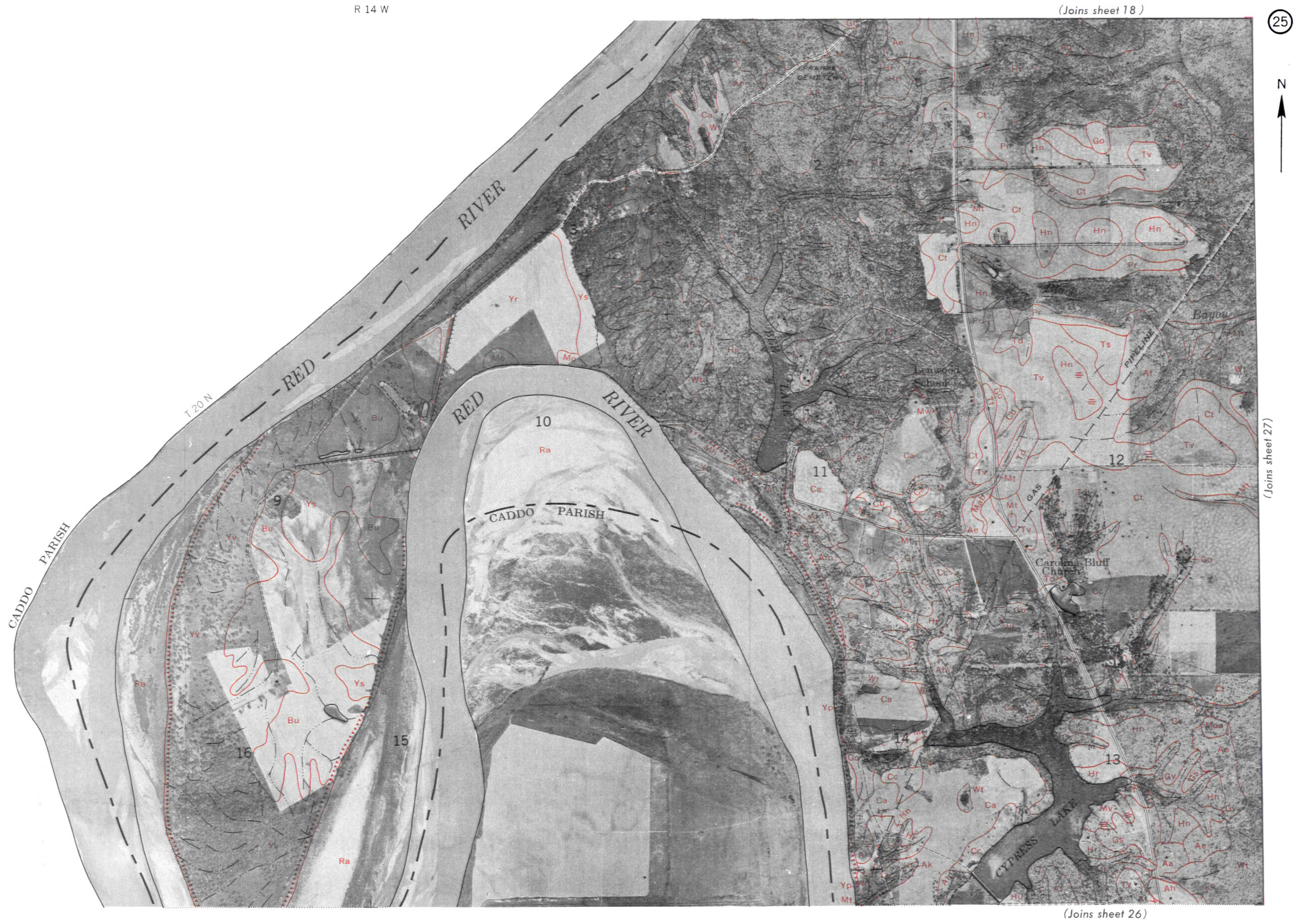
BOSSIER PARISH LOUISIANA – SHEET NUMBER 24





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BOSSIER PARISH, LOUISIANA-SHEET NUMBER 26

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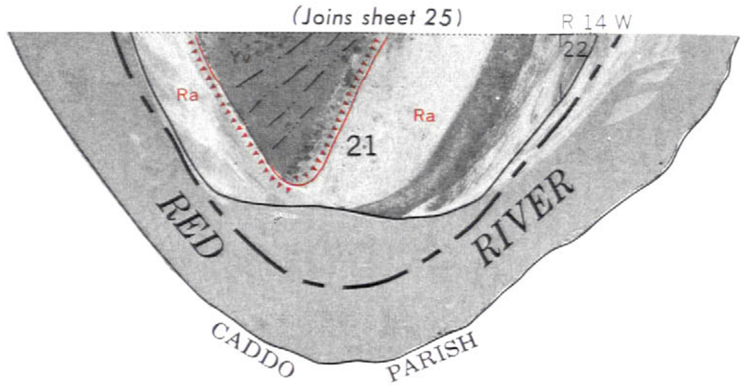

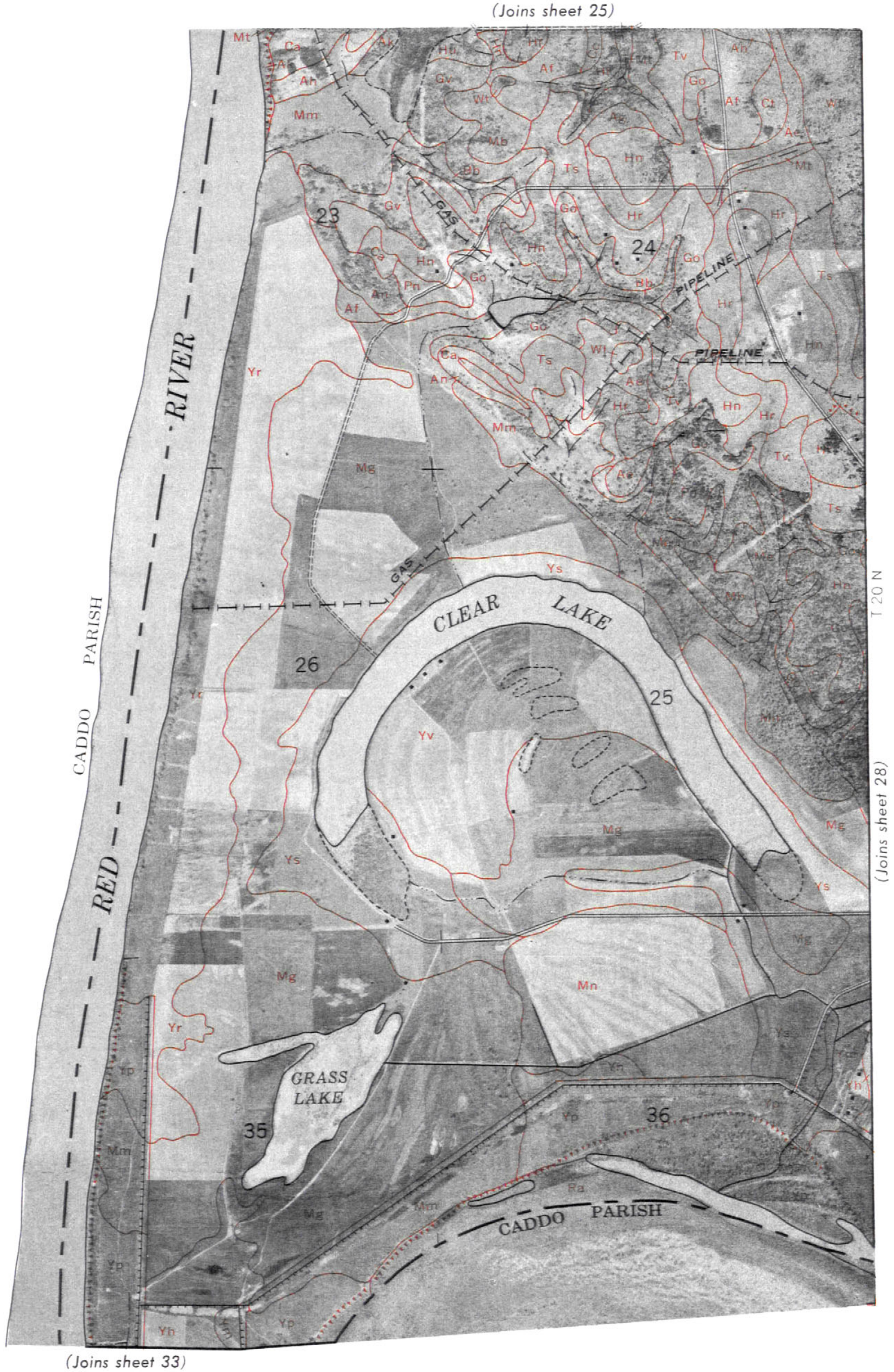

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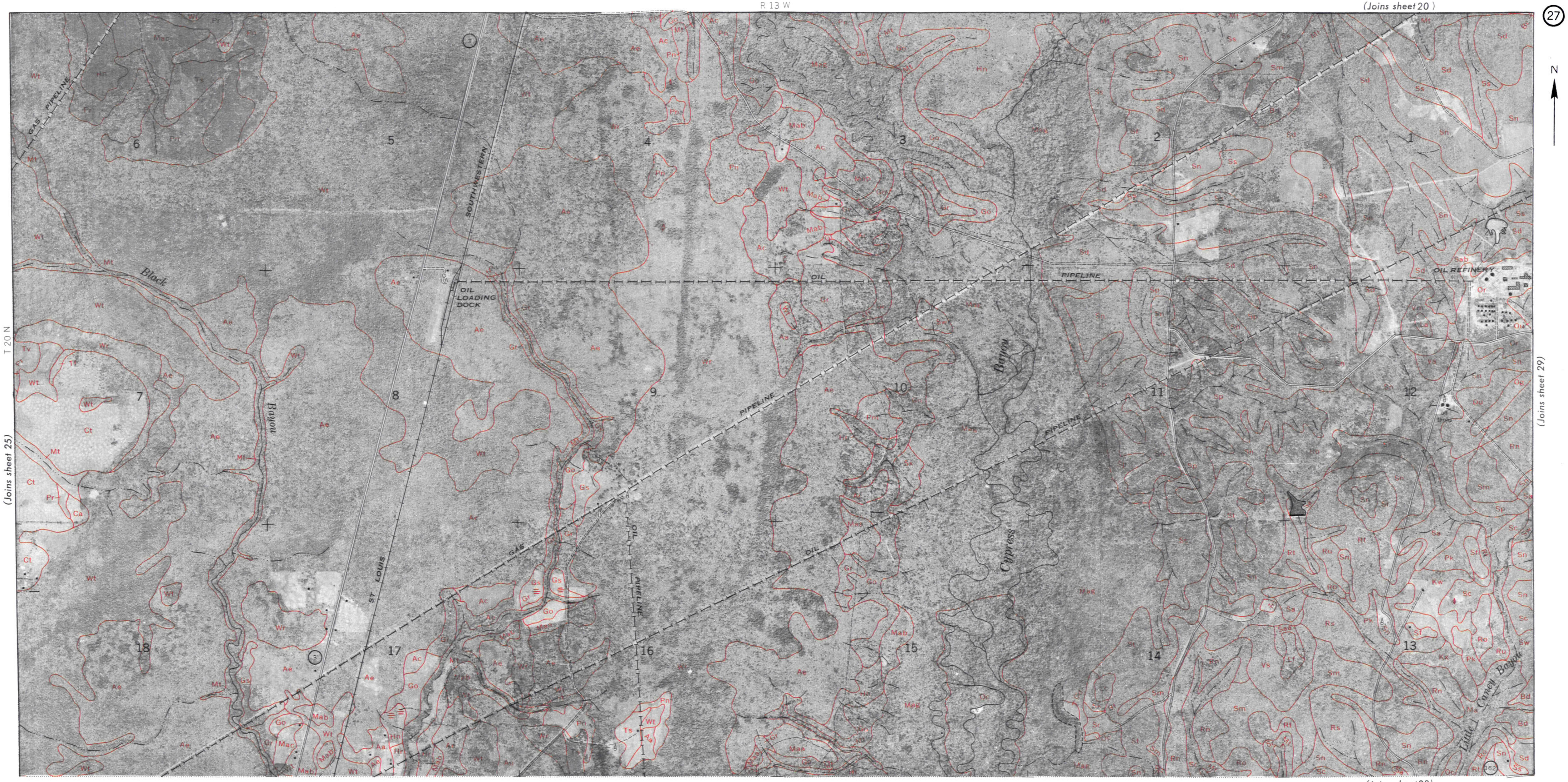
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 27



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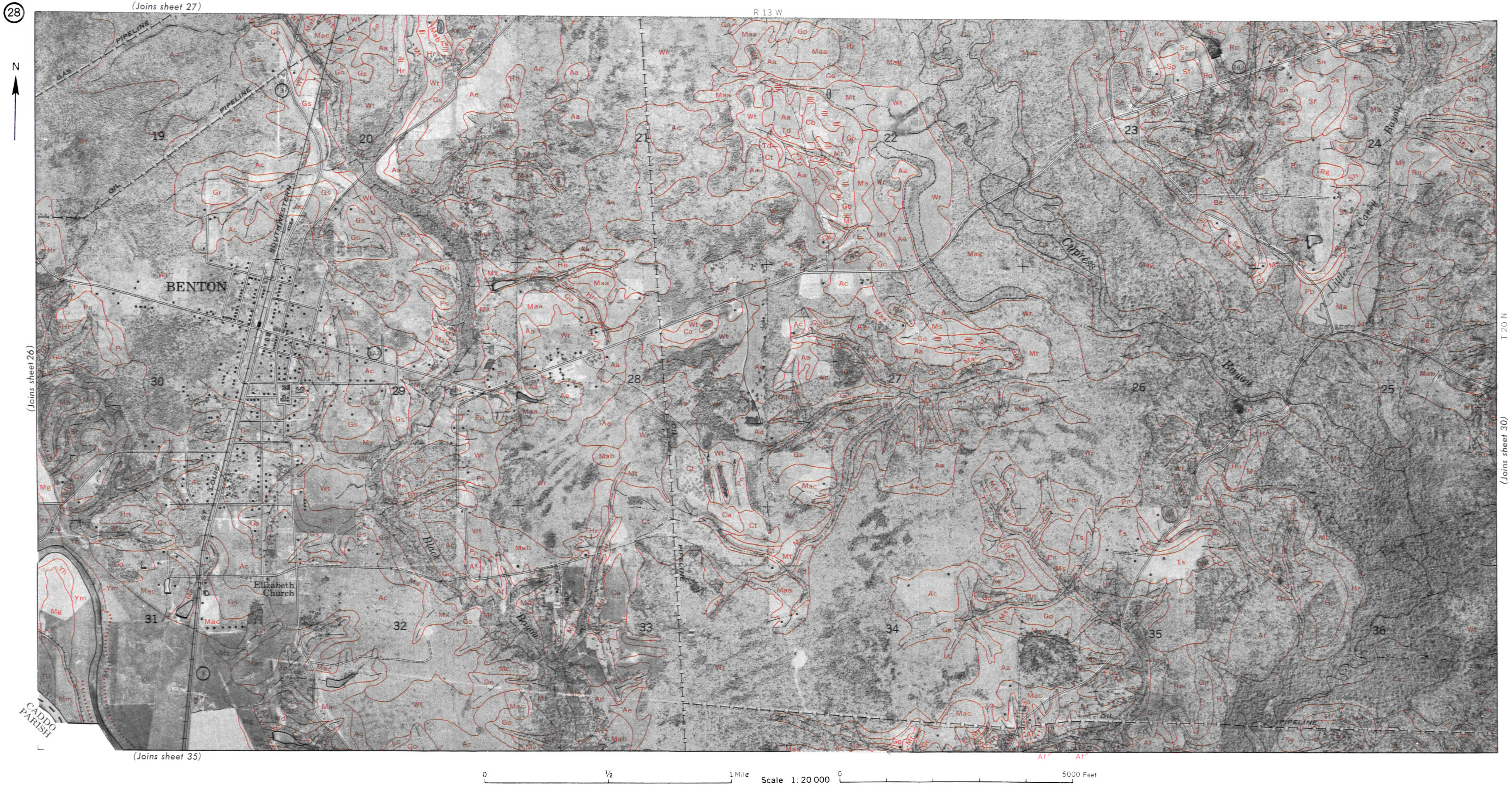
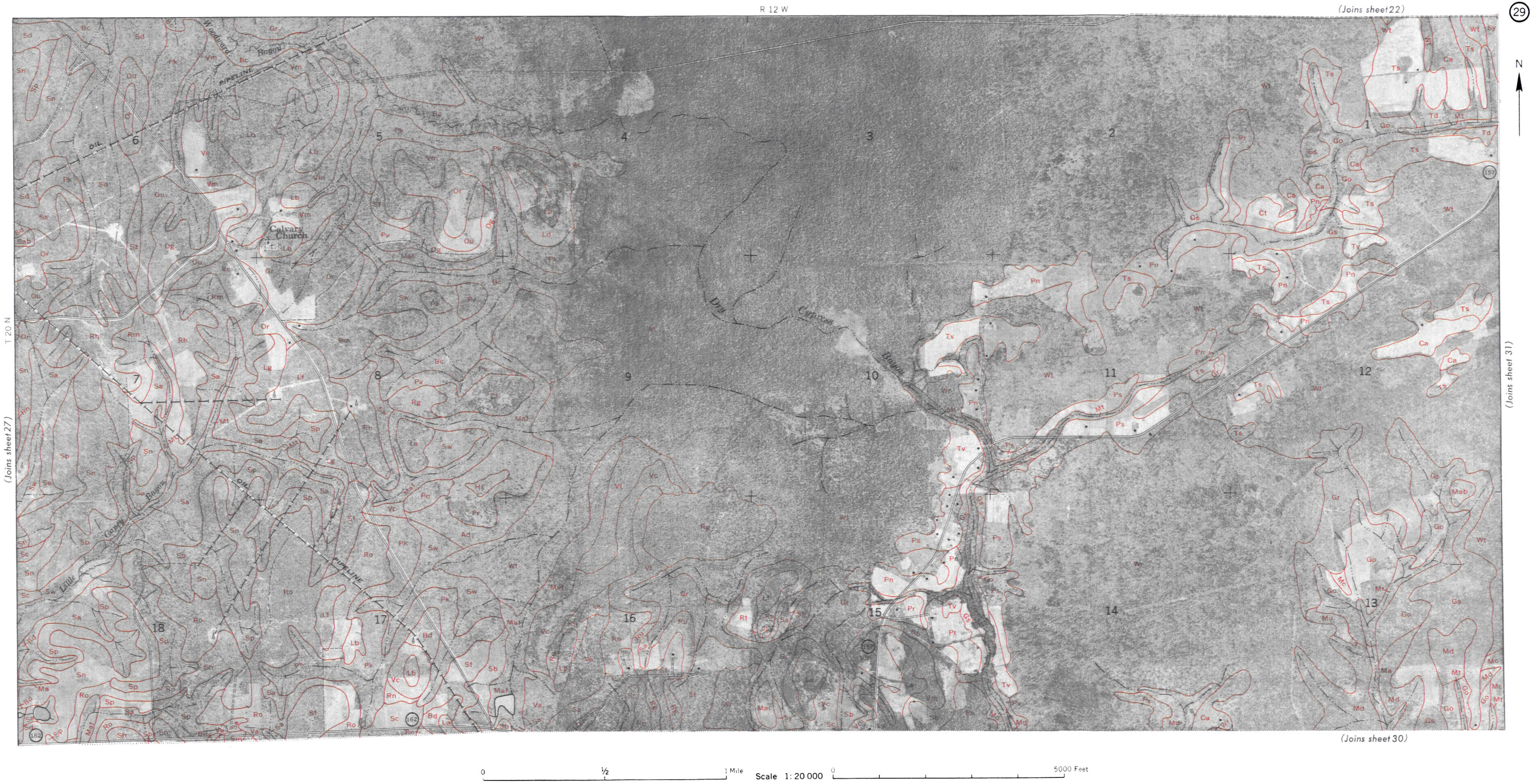
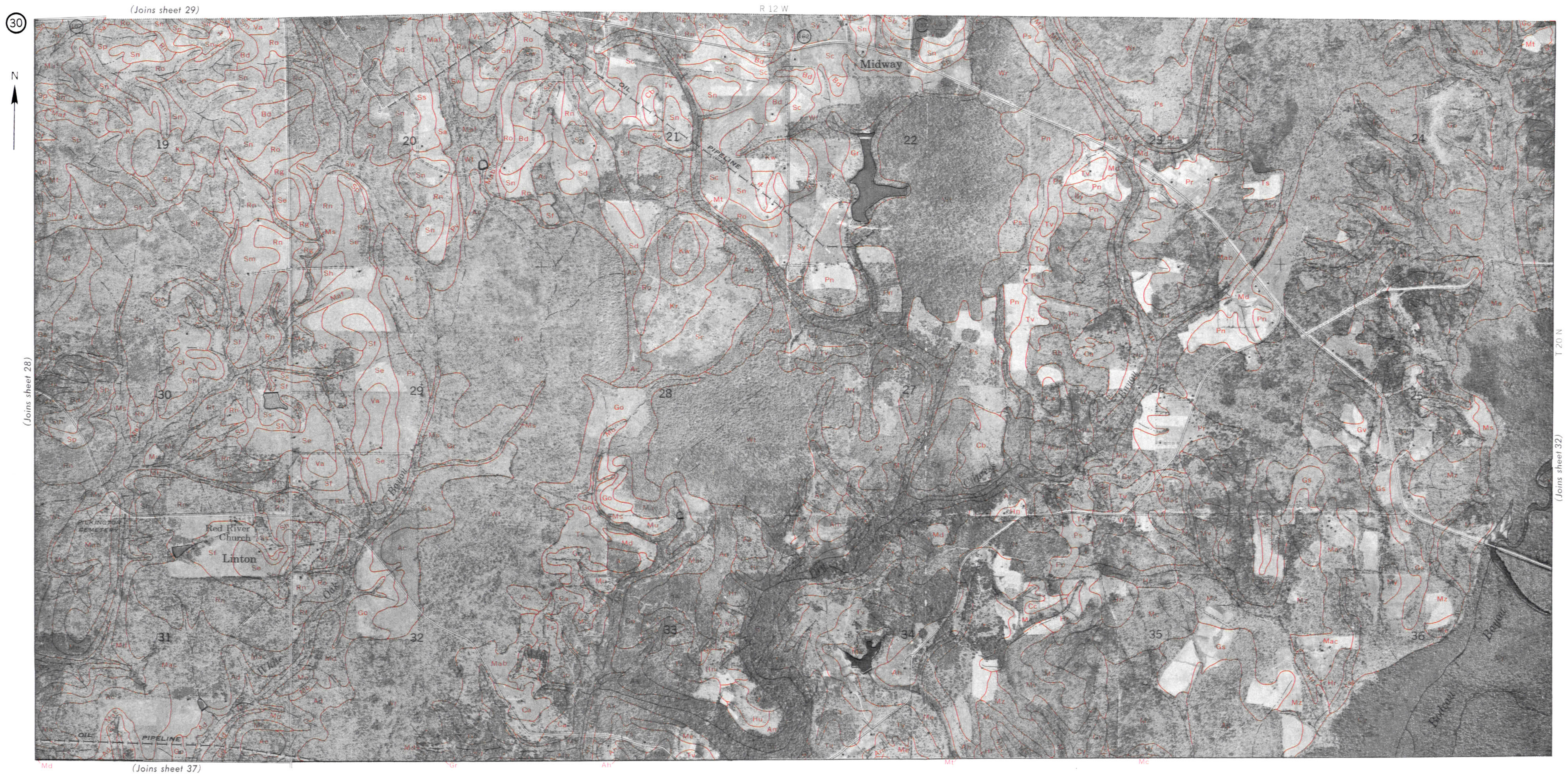
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 28



BOSSIER PARISH, LOUISIANA – SHEET NUMBER 29



BOSSIER PARISH, LOUISIANA–SHEET NUMBER 30



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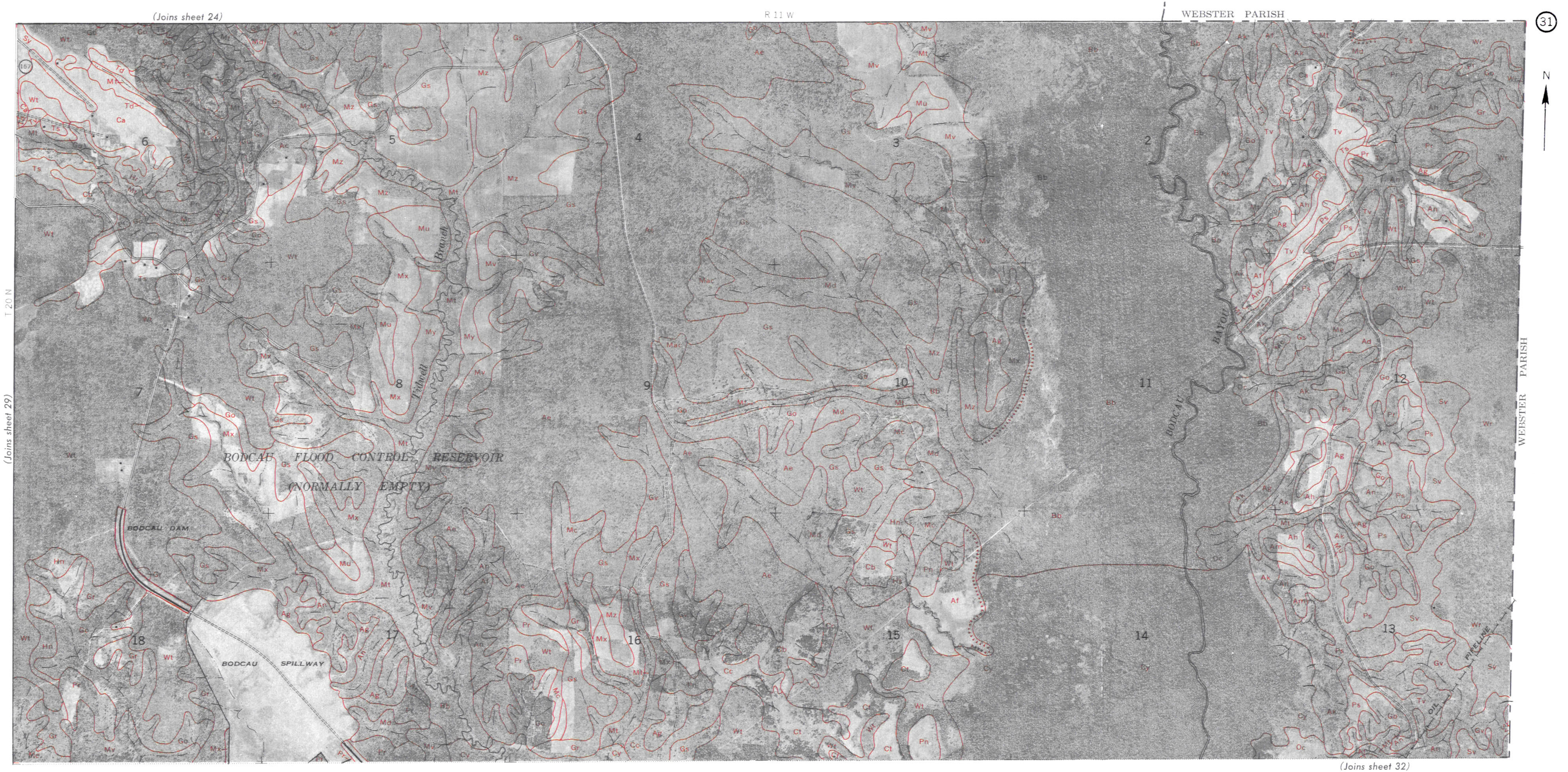
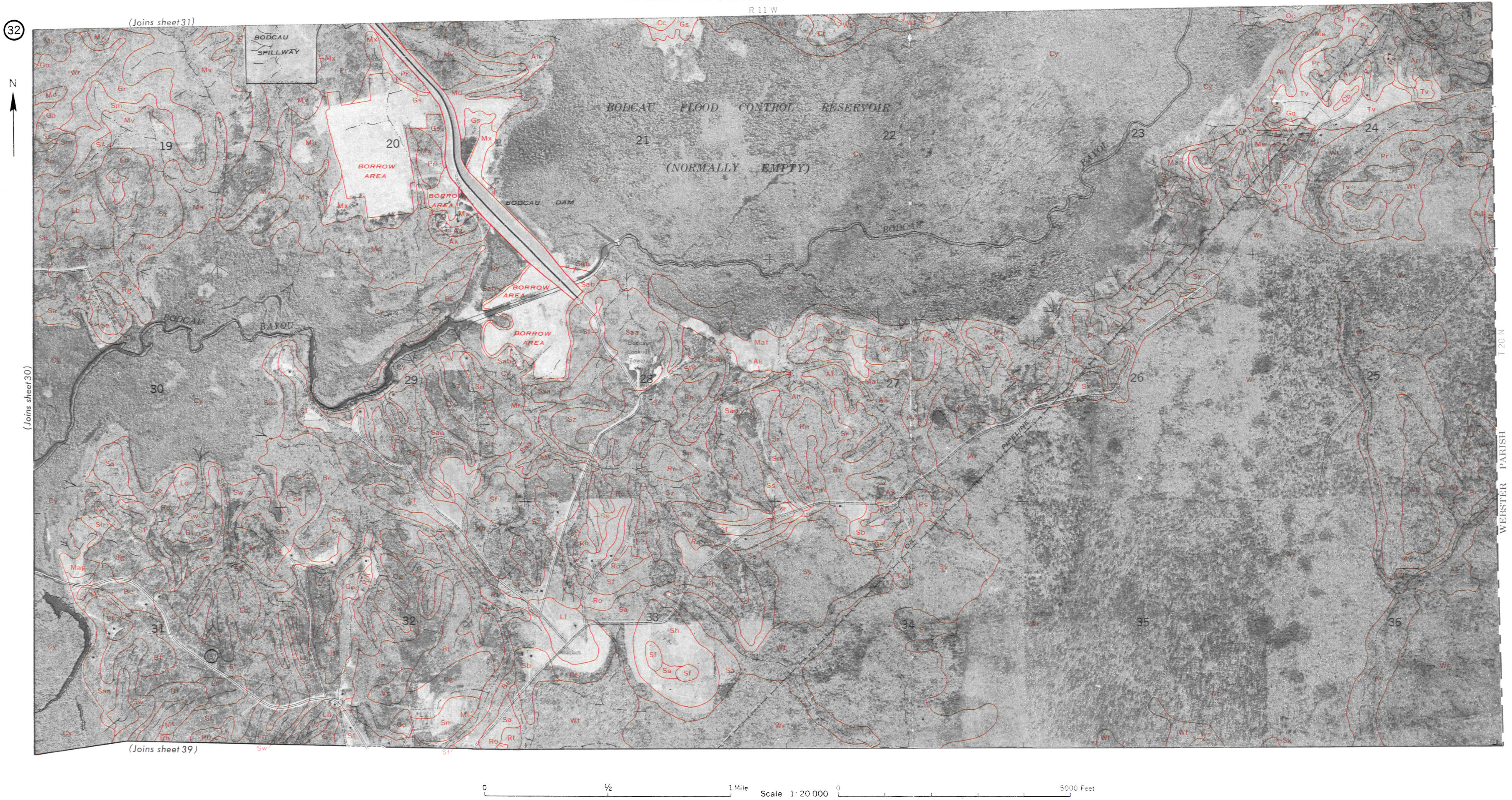
BOSSIER PARISH, LOUISIANA-SHEET NUMBER 31



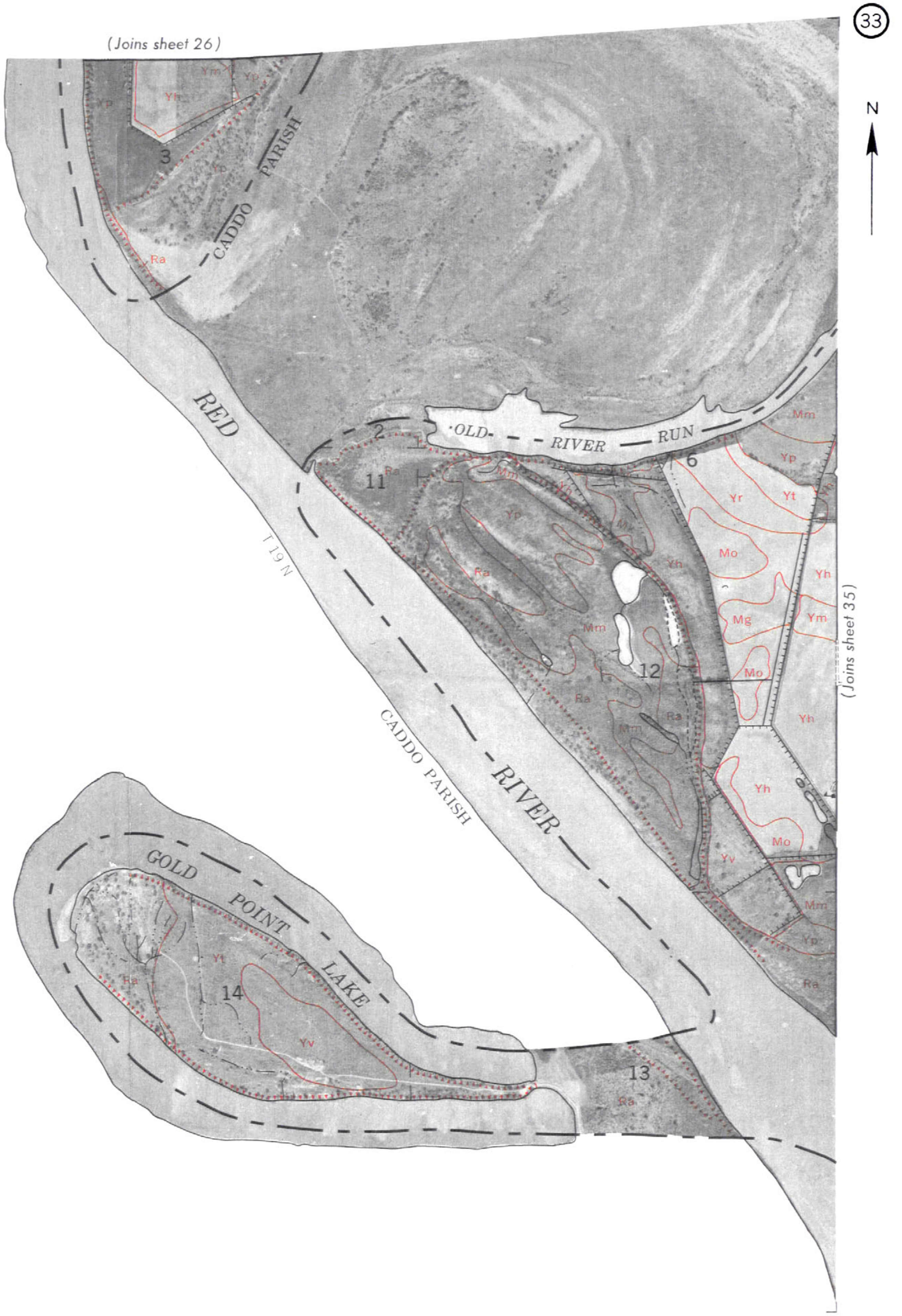
0 ½ 1 Mile Scale 1: 20 000 0 5000 Feet

BOSSIER PARISH, LOUISIANA – SHEET NUMBER 32



BOSSIER PARISH, LOUISIANA–SHEET NUMBER 33

R 14 W



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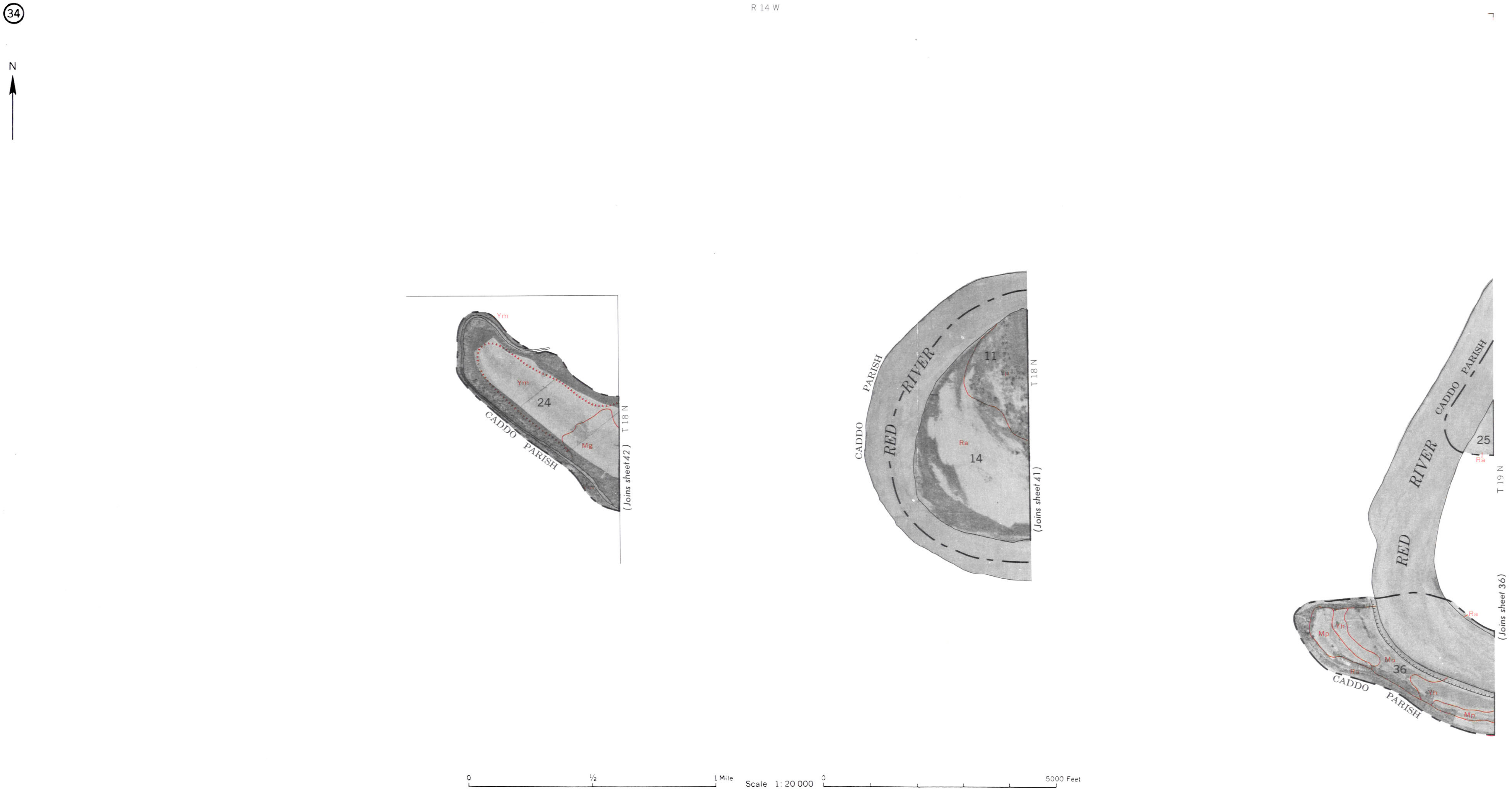
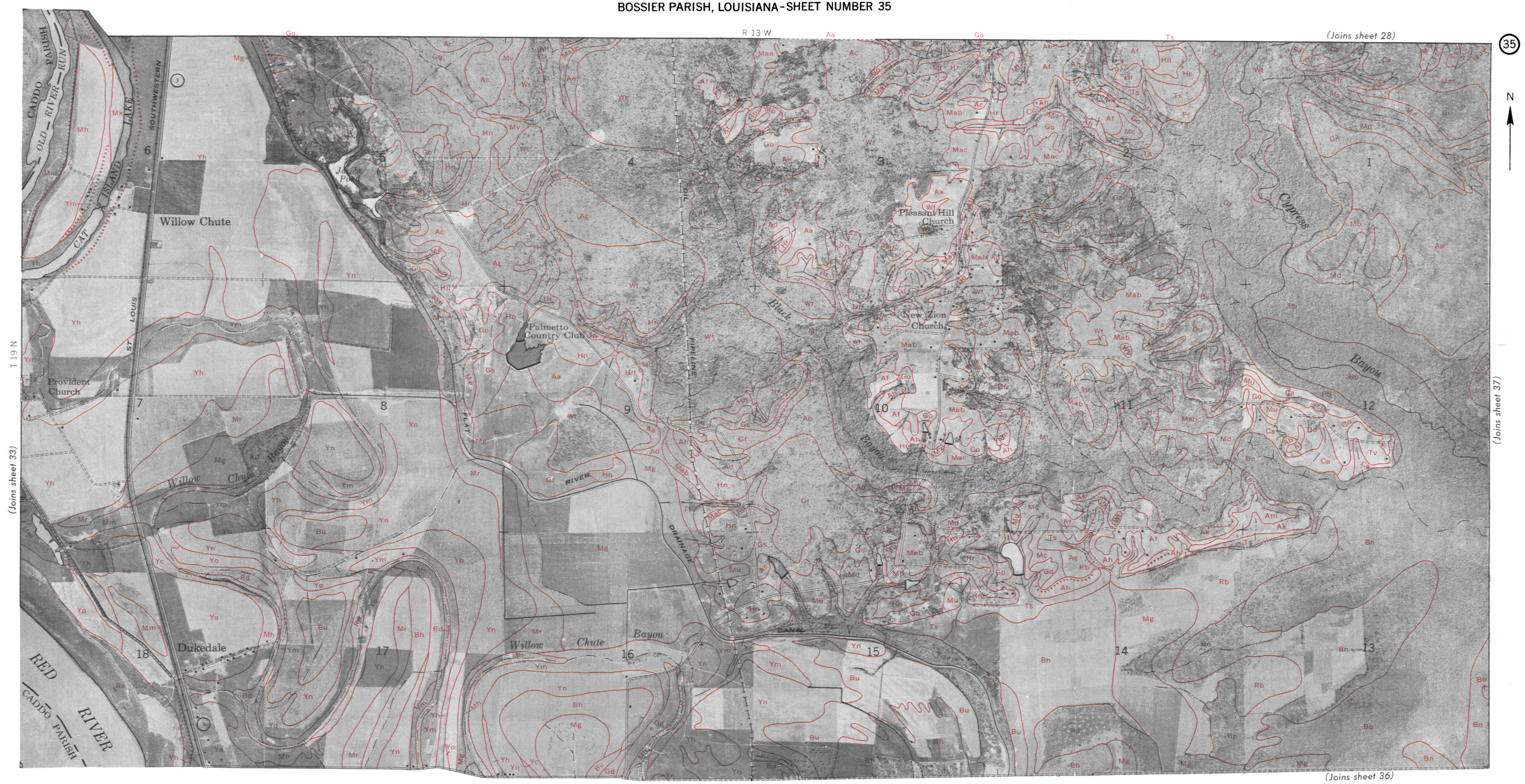
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 34



BOSSIER PARISH, LOUISIANA-SHEET NUMBER 35

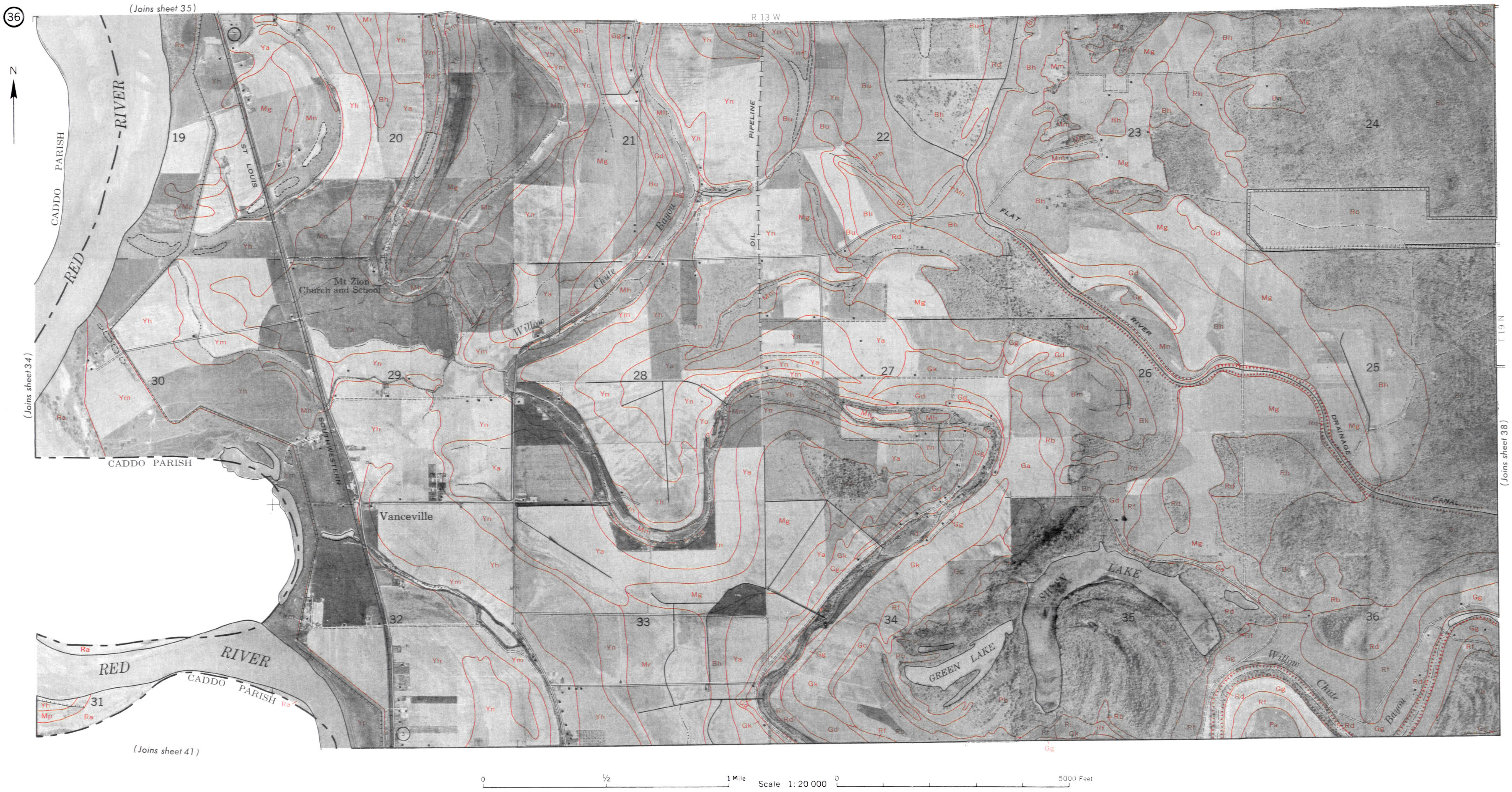


0 ½ 1 Mile

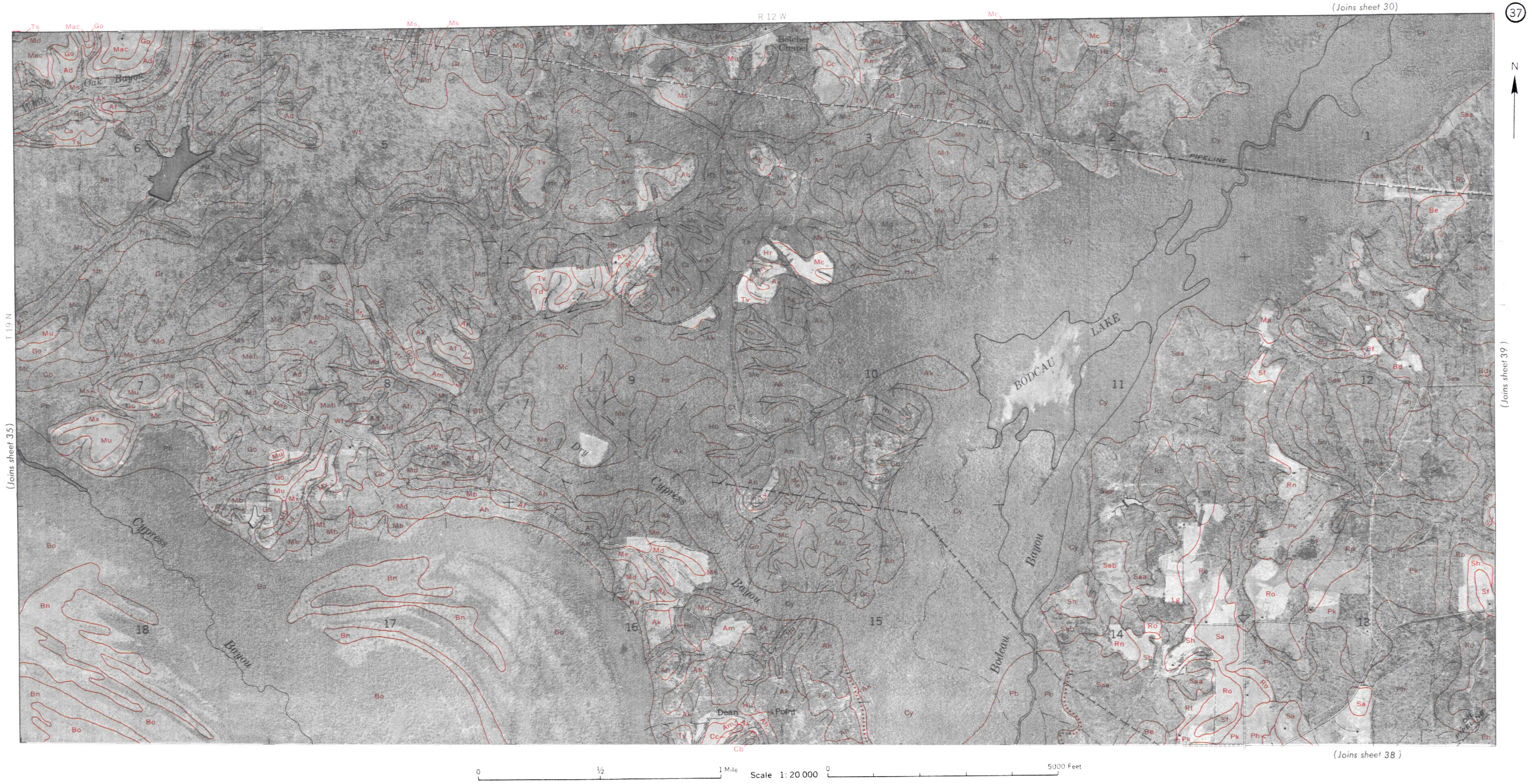
Scale 1: 20 000

0 5000 Feet

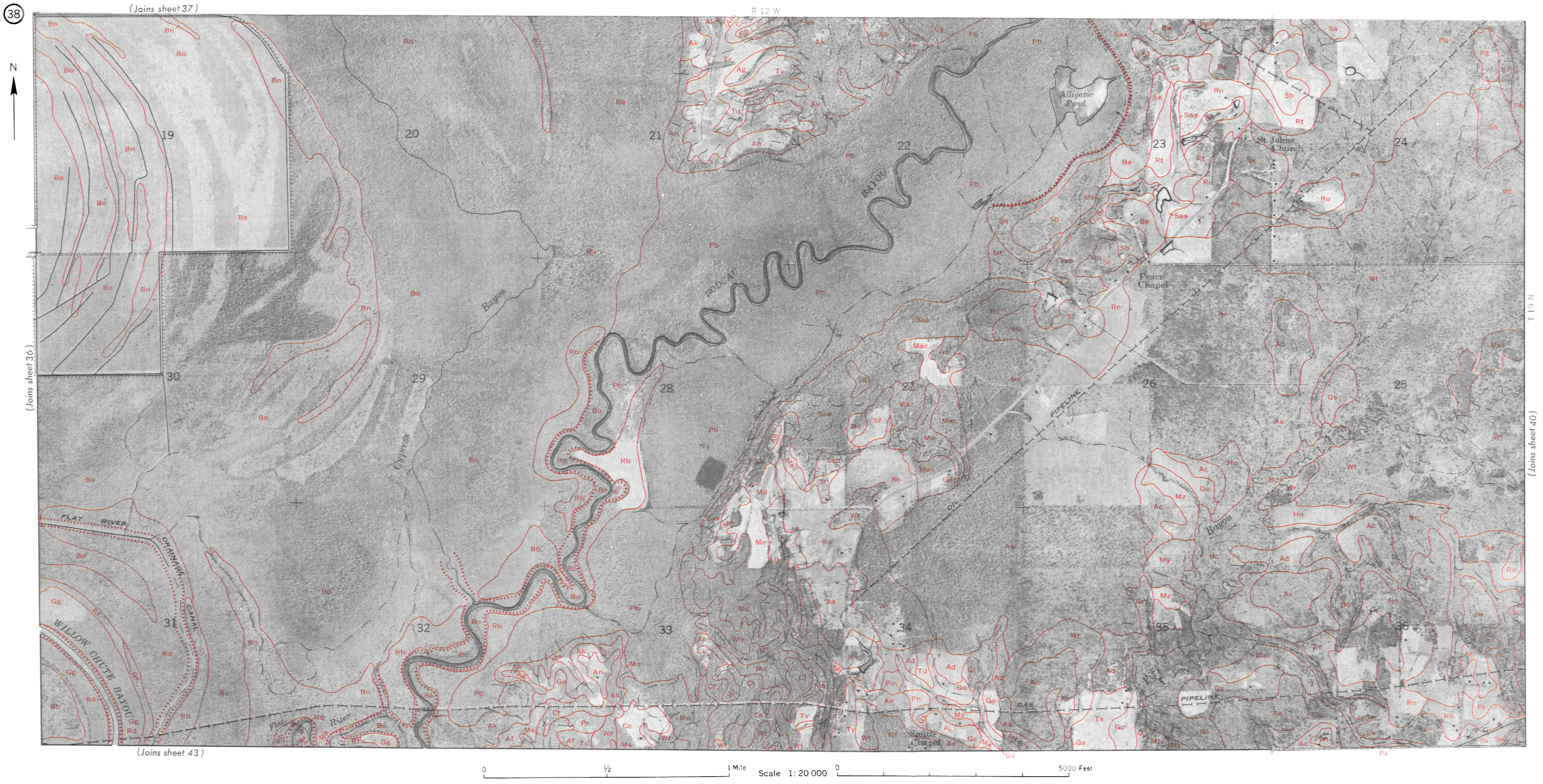
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 36



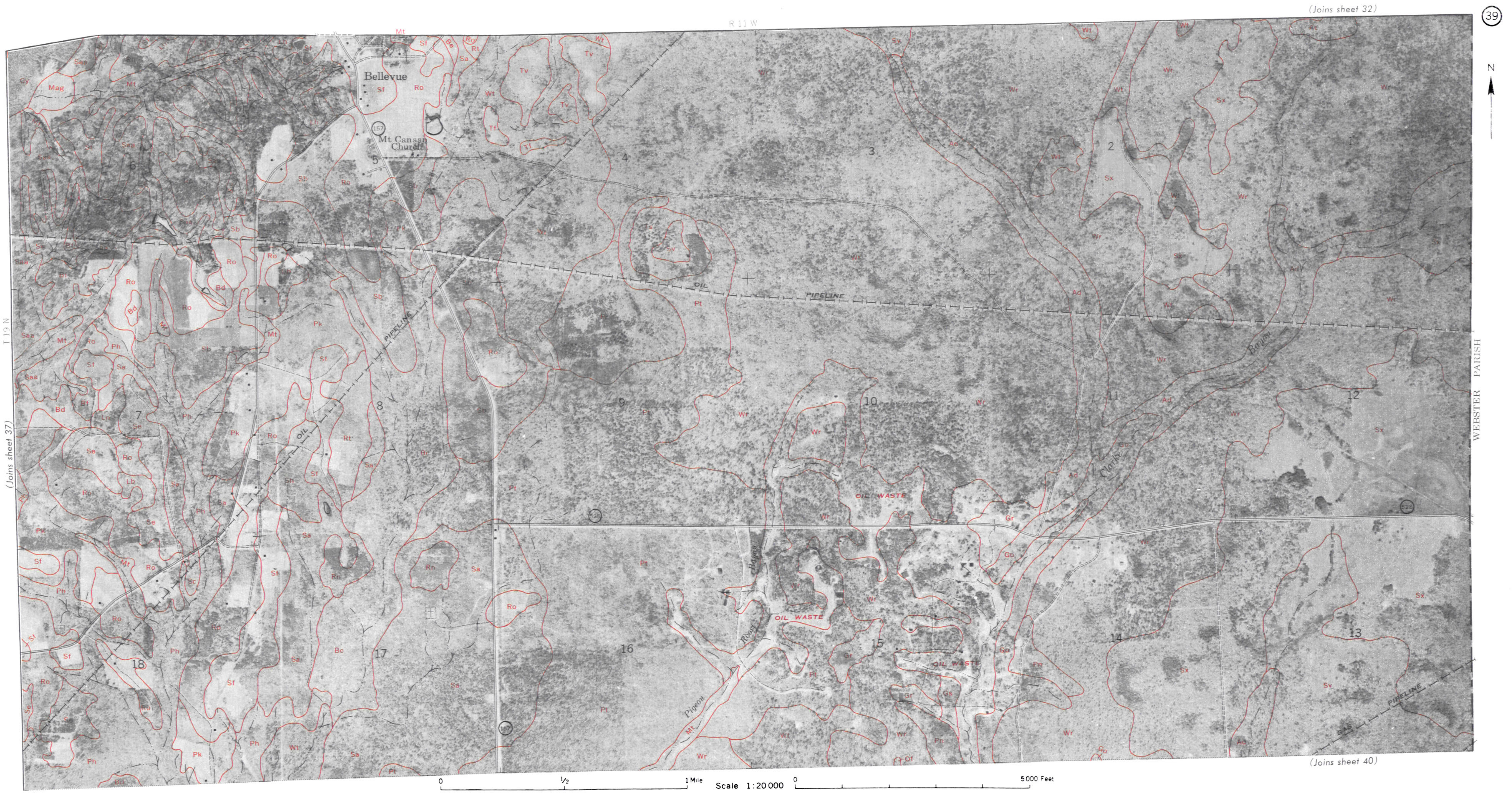
BOSSIER PARISH, LOUISIANA - SHEET NUMBER 37



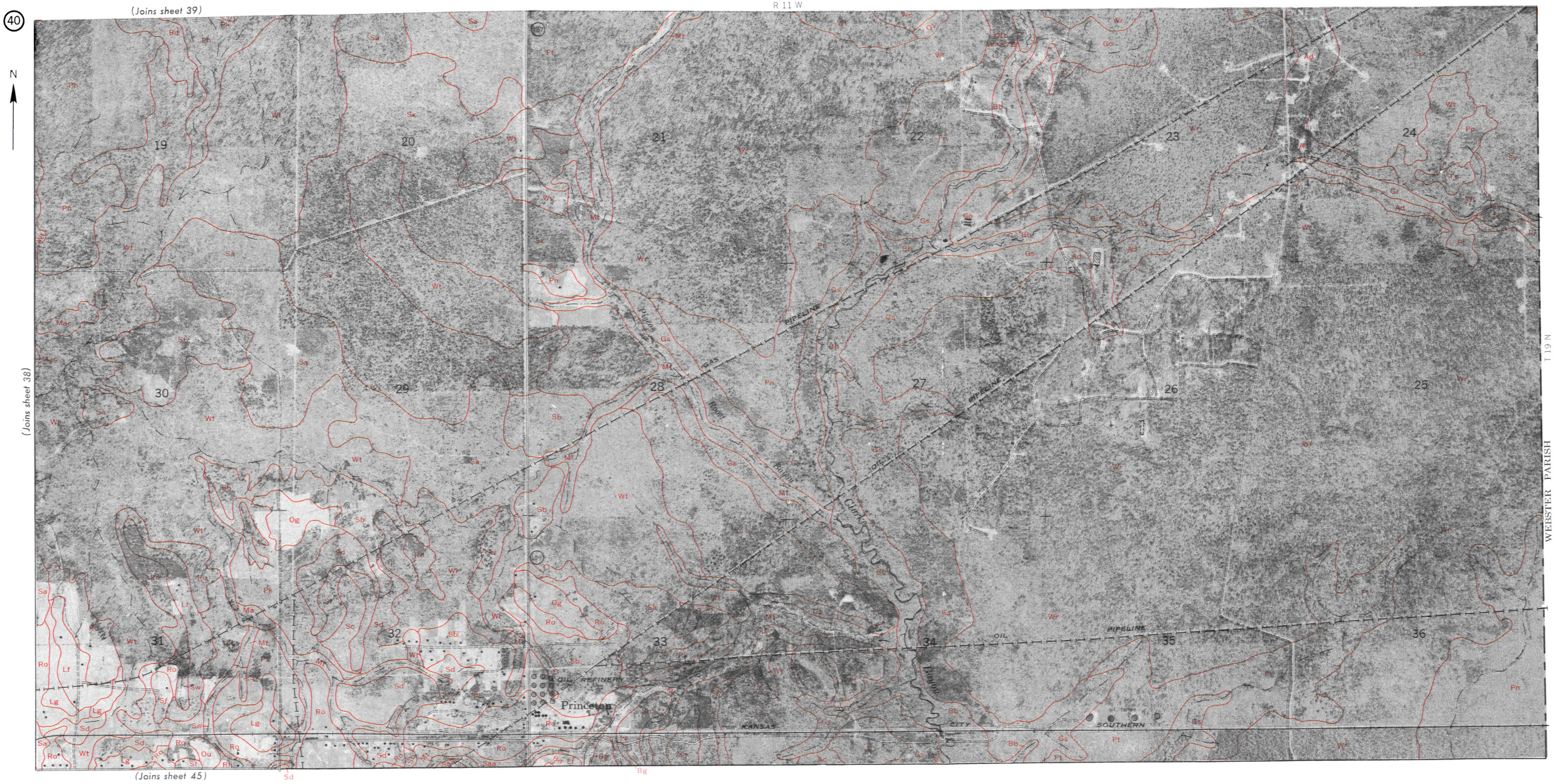
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 38



BOSSIER PARISH, LOUISIANA-SHEET NUMBER 39



BOSSIER PARISH, LOUISIANA—SHEET NUMBER 40

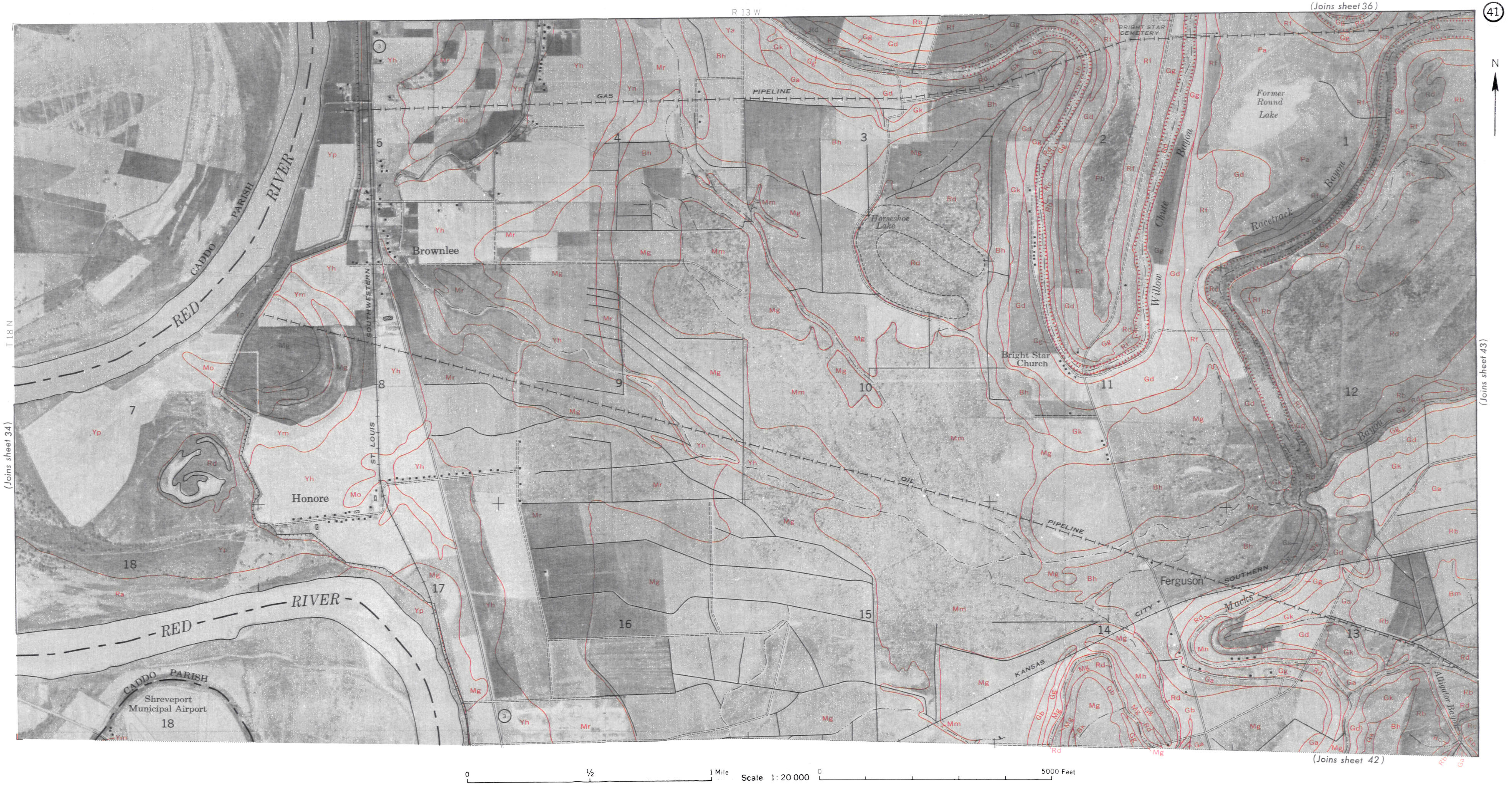


Scale 1: 20 000

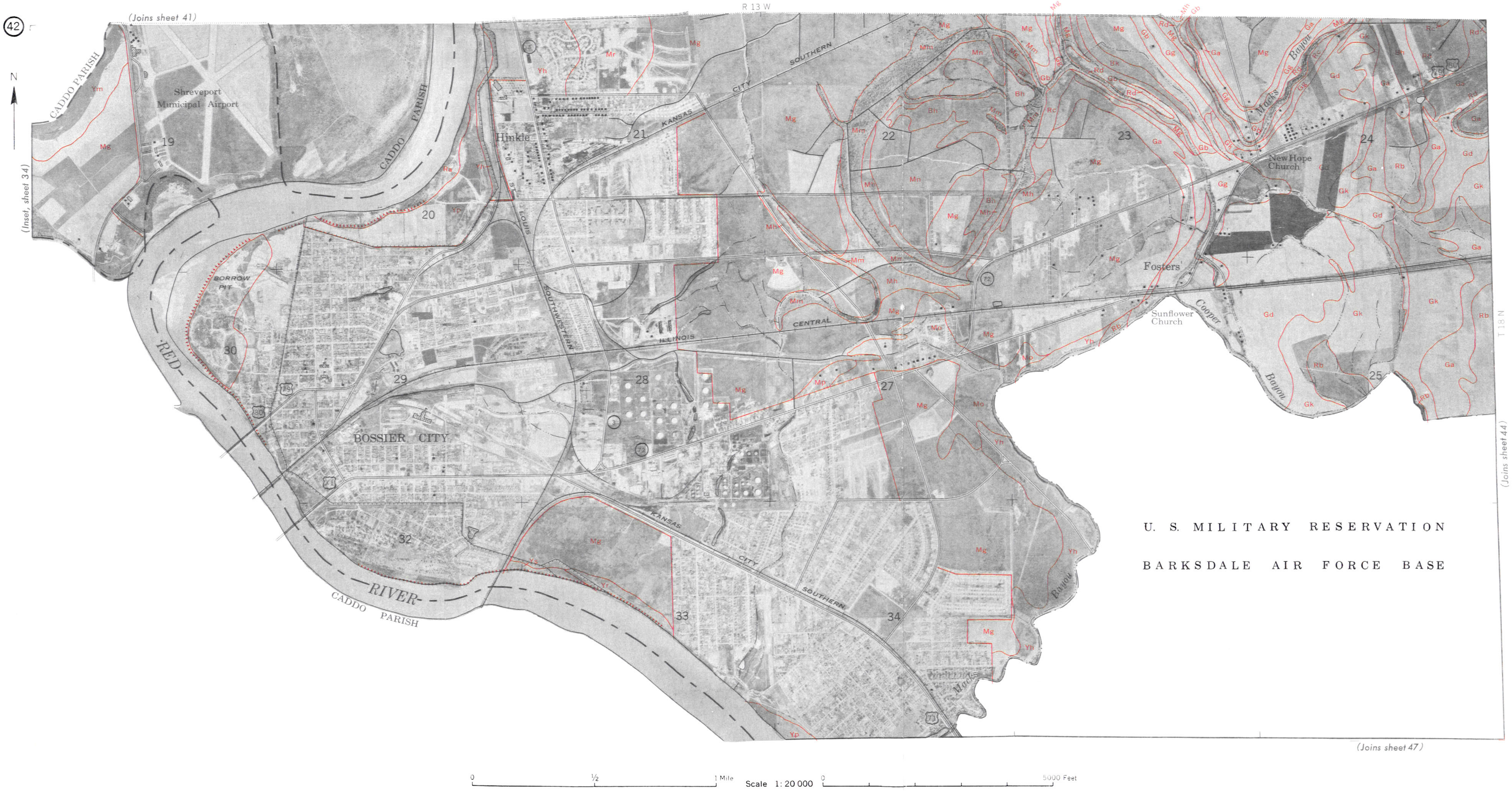
0 ½ 1 Mile

0 5000 Feet

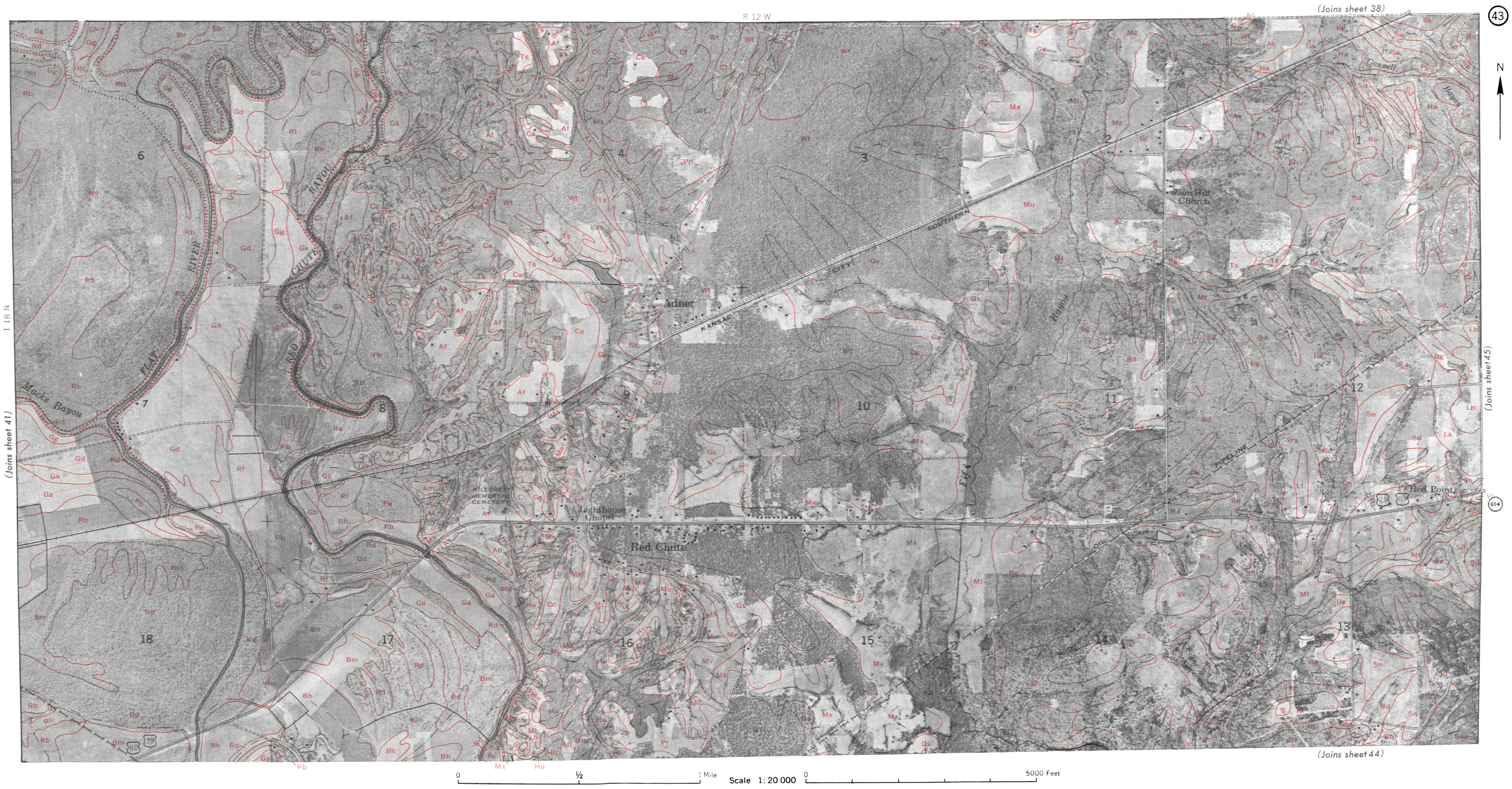
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 41



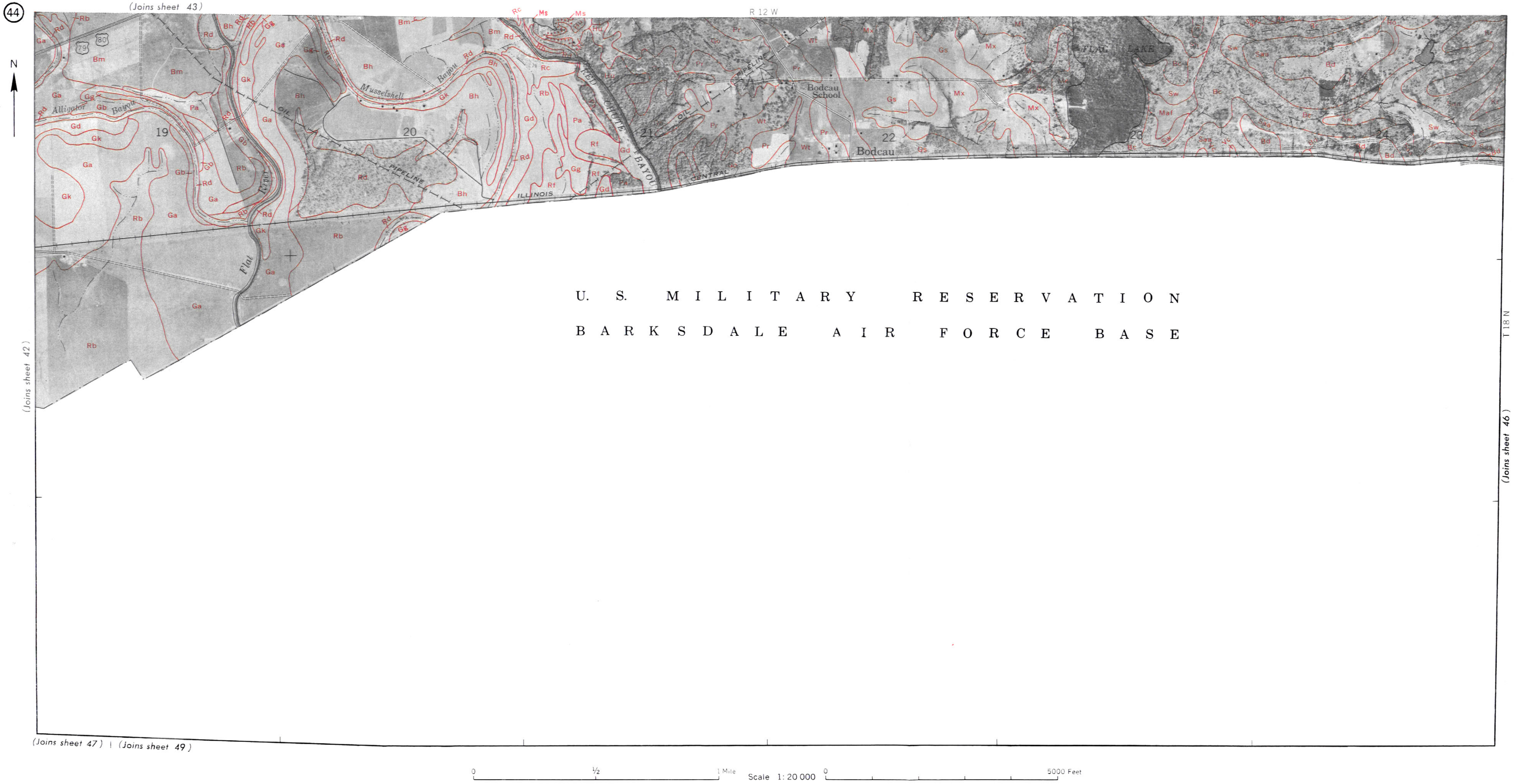
BOSSIER PARISH, LOUISIANA—SHEET NUMBER 42

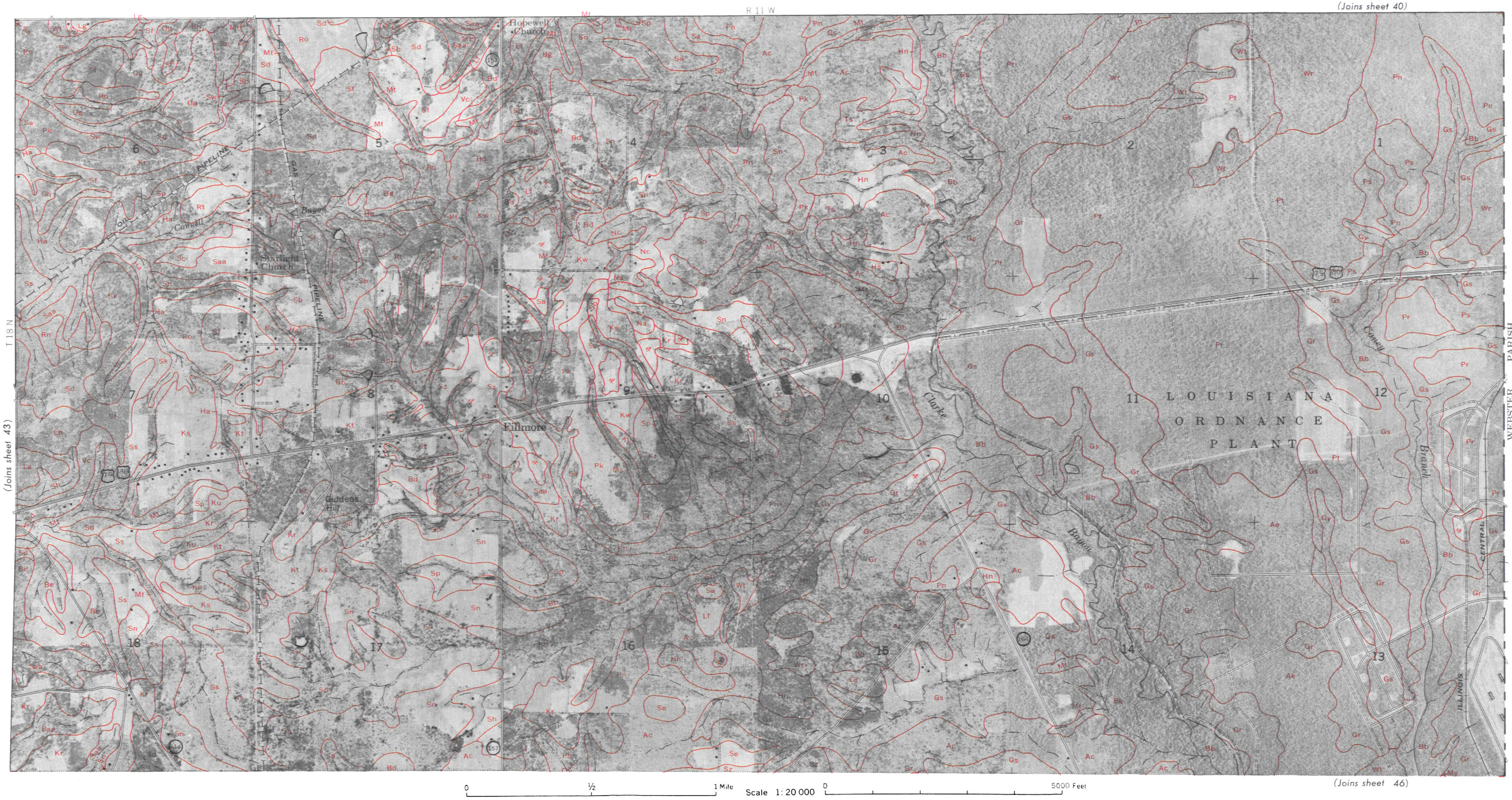


BOSSIER PARISH, LOUISIANA—SHEET NUMBER 43



BOSSIER PARISH, LOUISIANA–SHEET NUMBER 44





Scale 1: 20 000

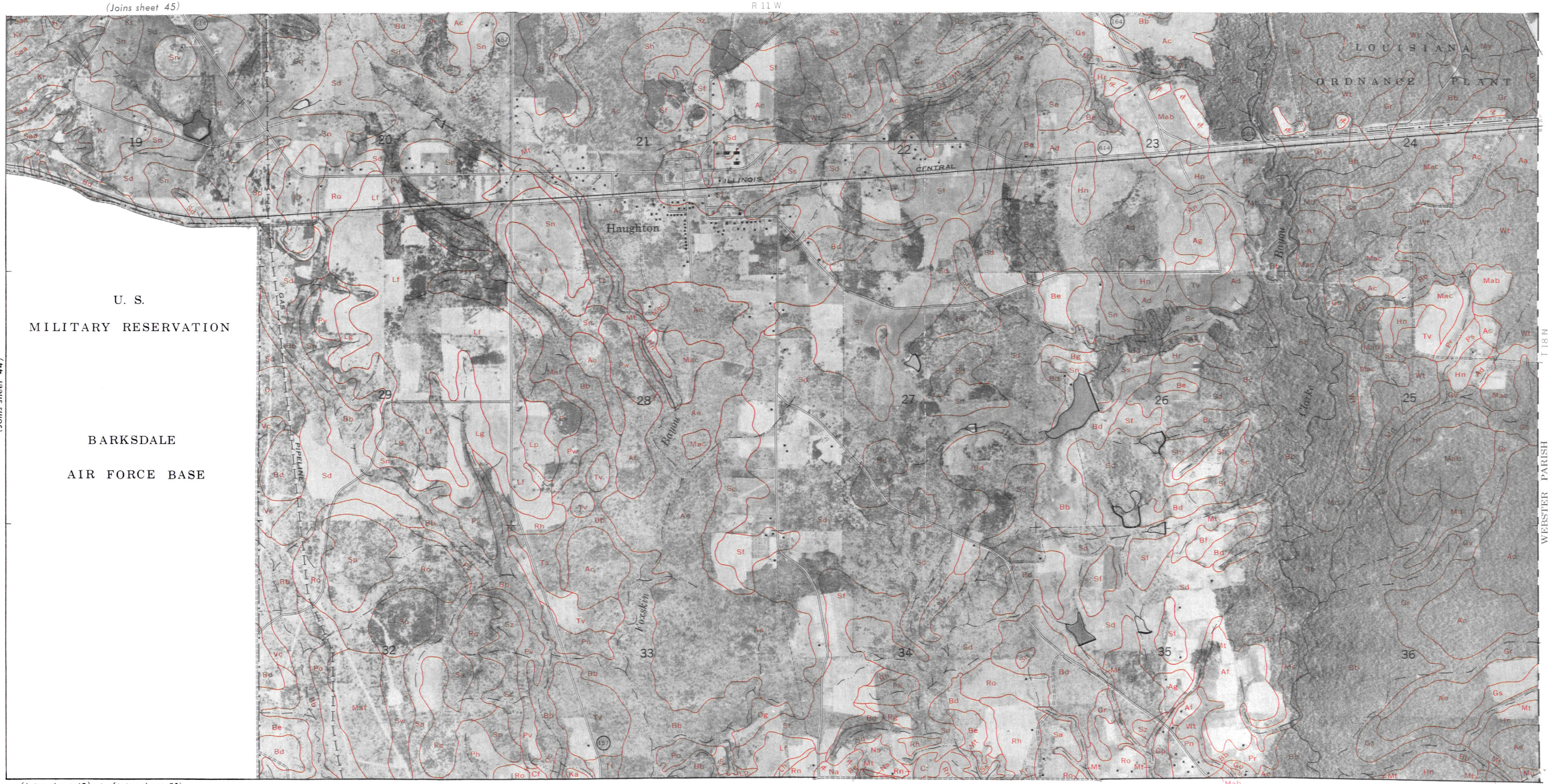
0 ½ 1 Mile

0 5000 Feet

BOSSIER PARISH, LOUISIANA—SHEET NUMBER 46

(Joins sheet 45)

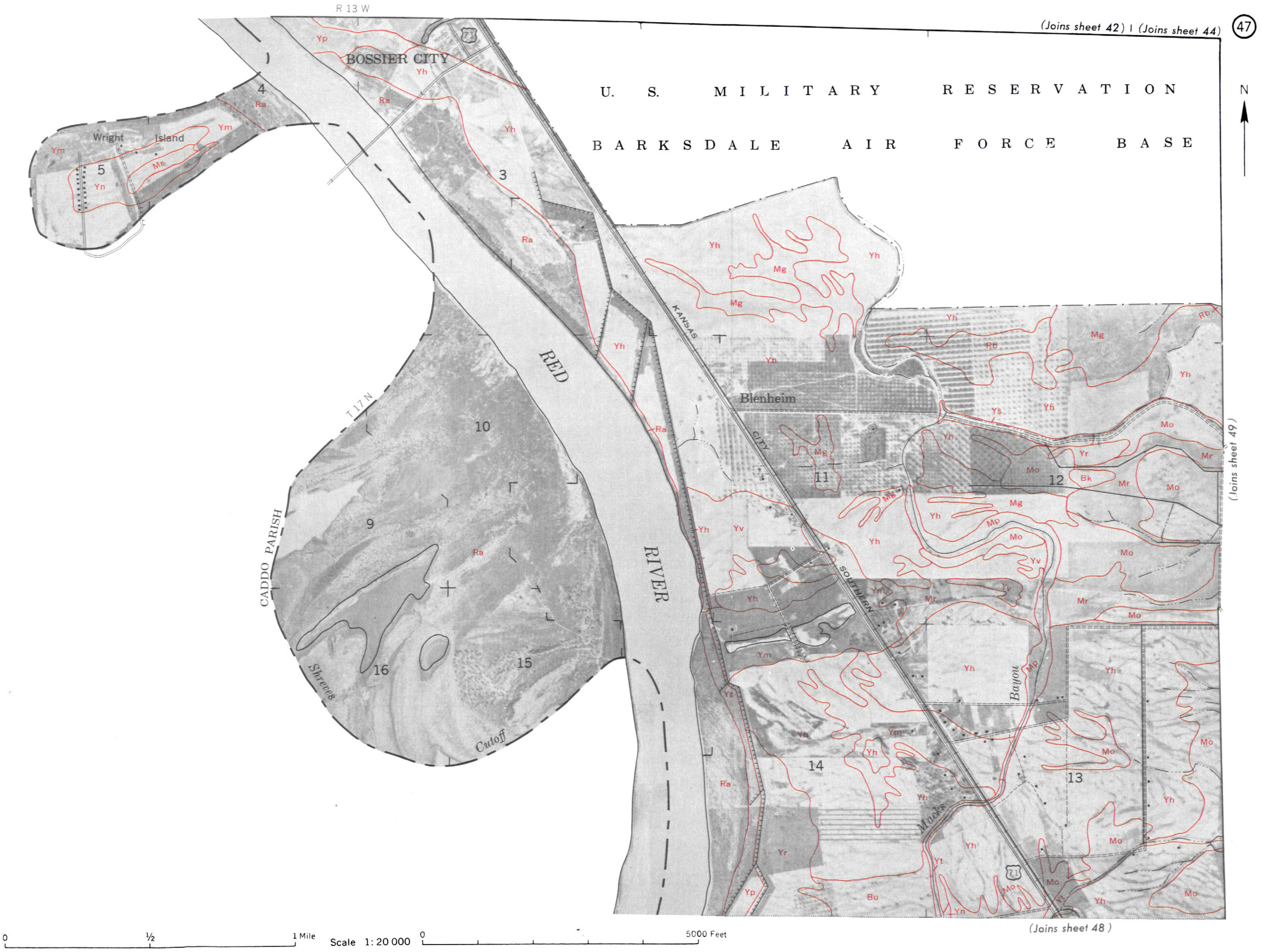
(Joins sheet 44)



(Joins sheet 49) | (Joins sheet 51)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

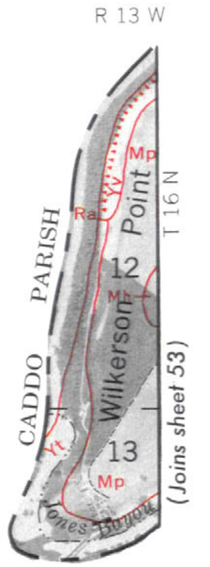
BOSSIER PARISH, LOUISIANA – SHEET NUMBER 47

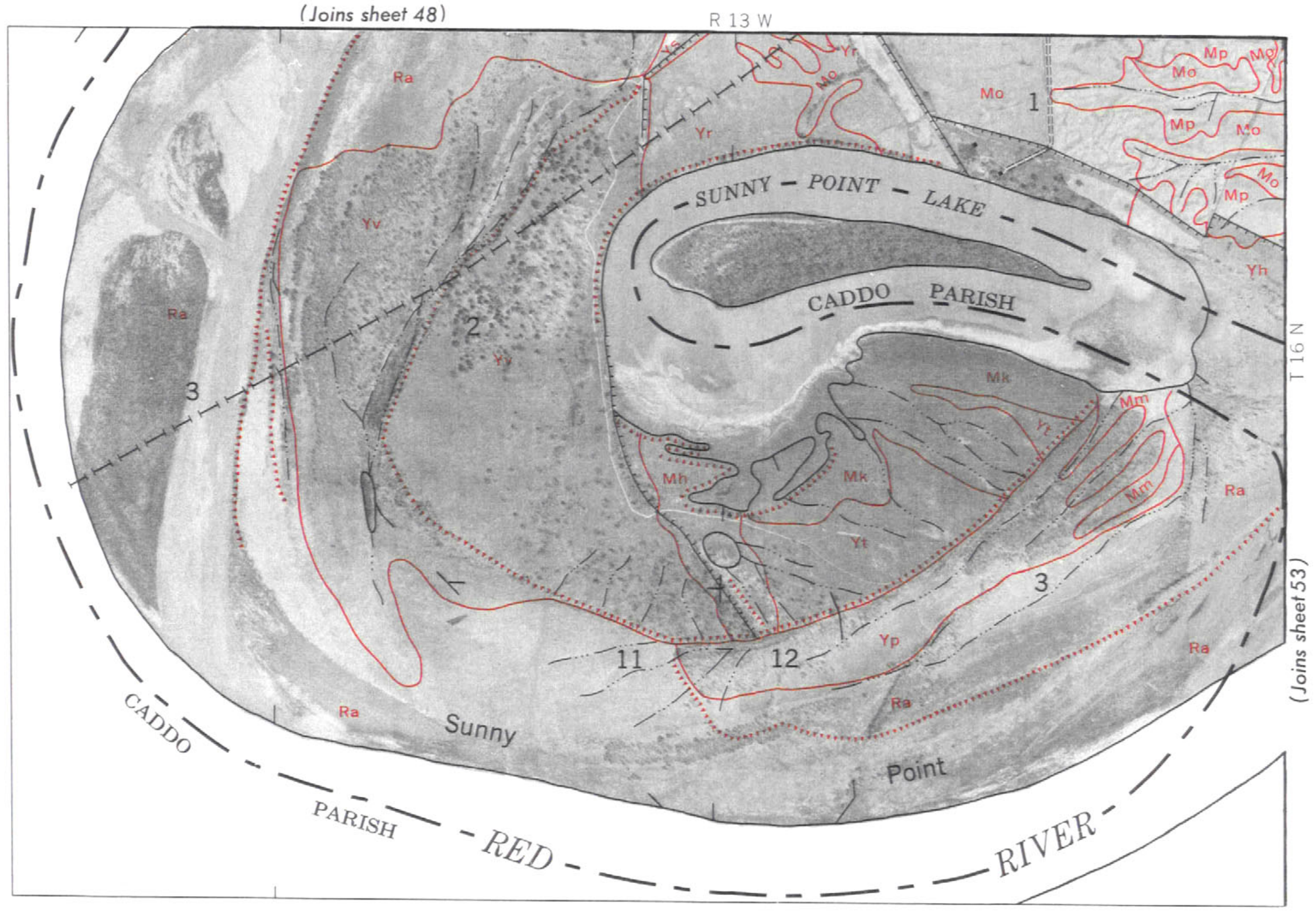


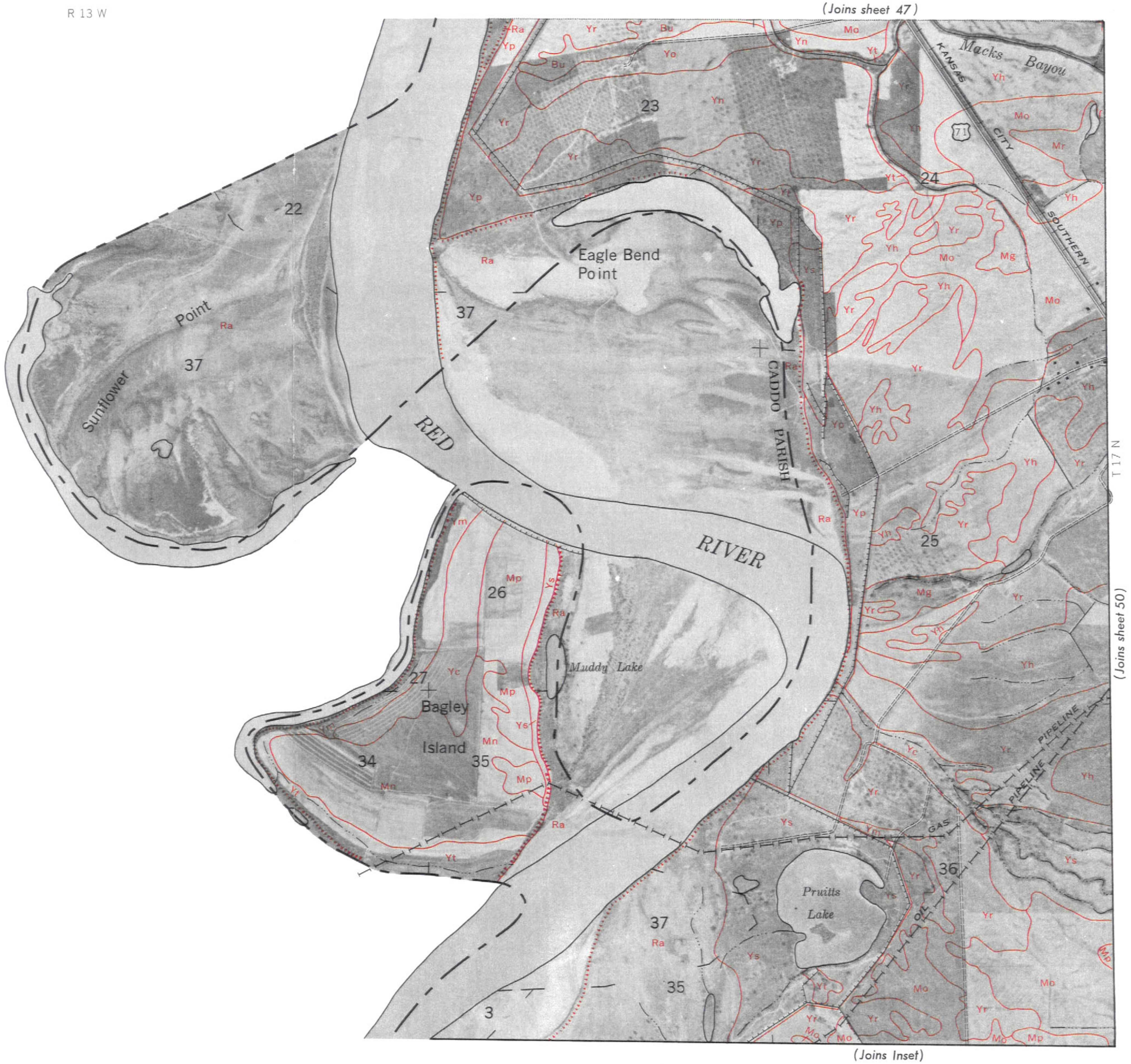
BOSSIER PARISH, LOUISIANA — SHEET NUMBER 48

48

N



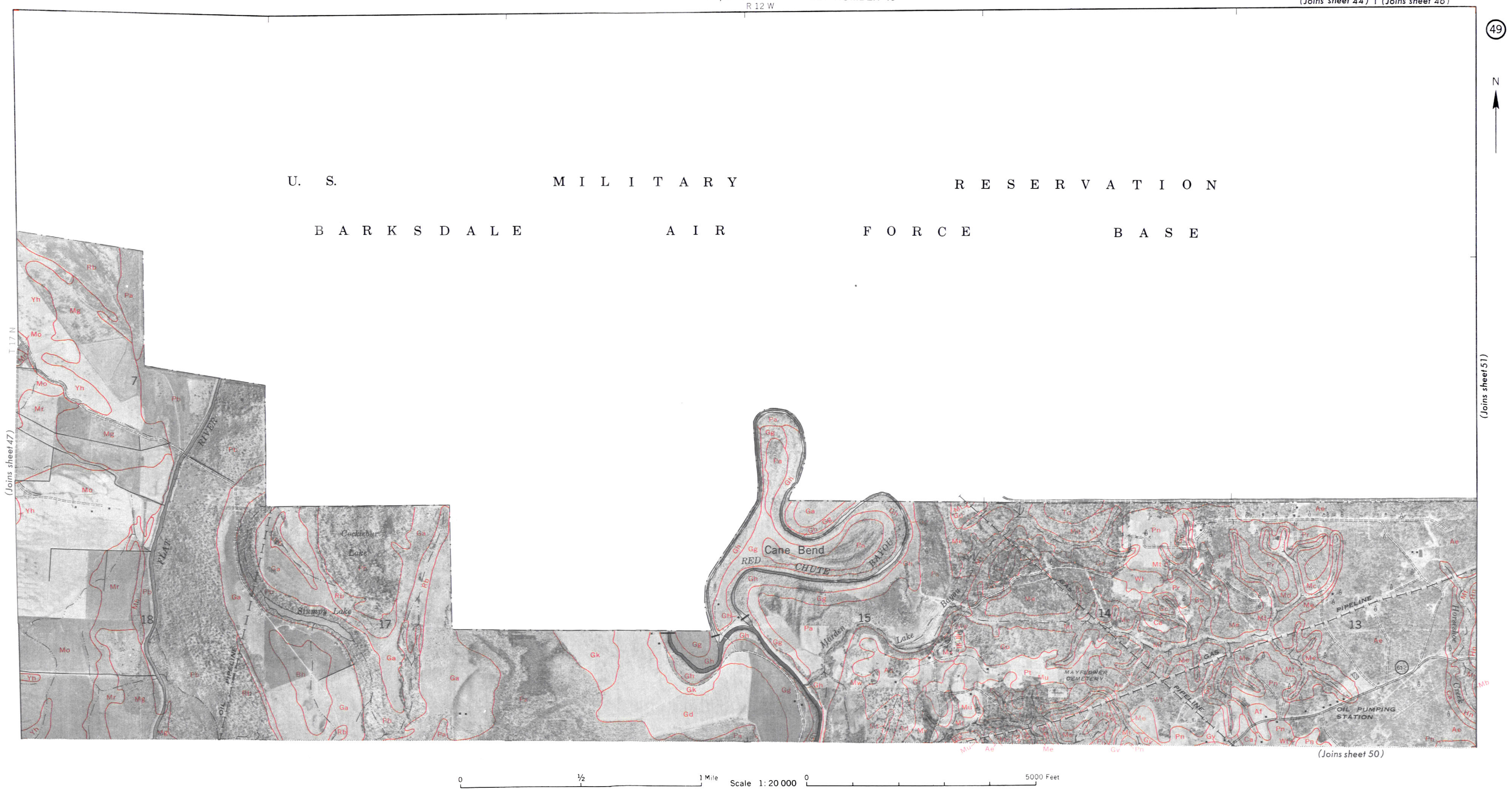




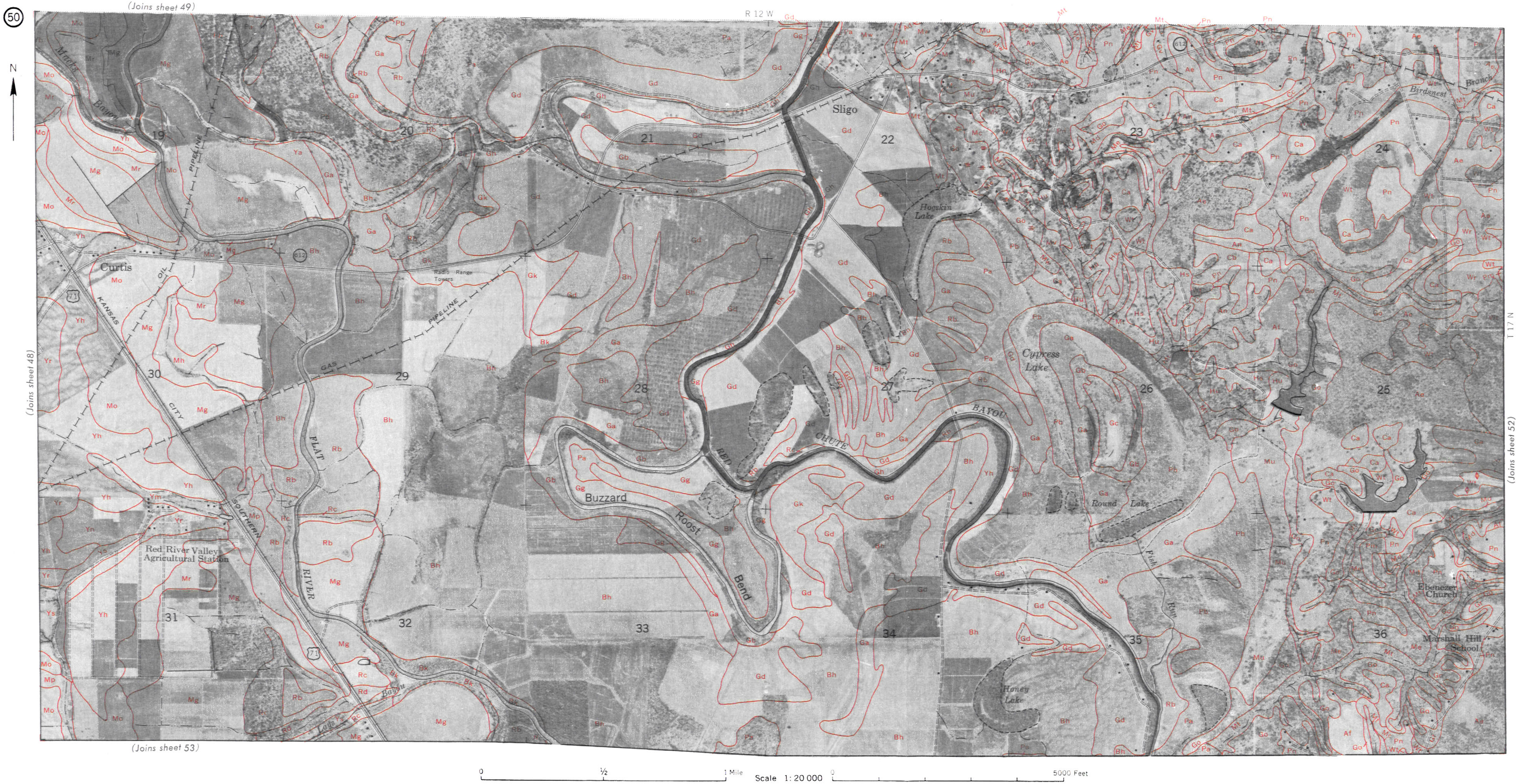
0 ½ 1 Mile

Scale 1: 20 000

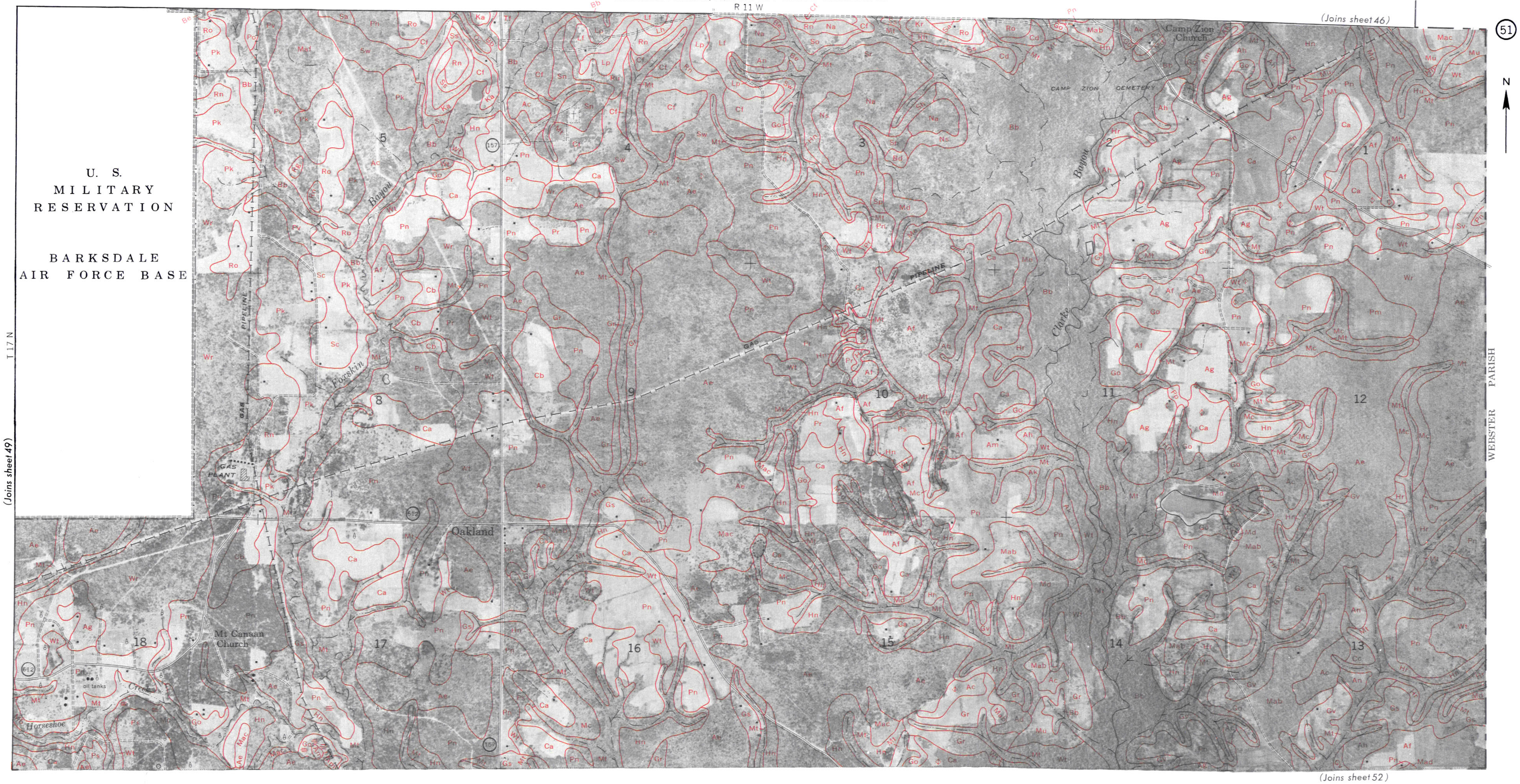
0 5000 Feet


R 12 W
(Joins sheet 44) | (Joins sheet 46)
49
N
T 17 N
(Joins sheet 47)
(Joins sheet 51)
(Joins sheet 50)
U. S. MILITARY RESERVATION
BARKSDALE AIR FORCE BASE
FLAT RIVER
OIL PIPELINE
Cocklebur Lake
Stumpy Lake
Cane Bend
RED CHUTE BAYOU
Murden Lake
Bayou
GAS PIPELINE
MAYFLOWER CEMETERY
OIL PUMPING STATION
Horsehoe Creek
613
7
18
17
15
14
13
Scale 1: 20 000
0
½
1 Mile
0
5000 Feet

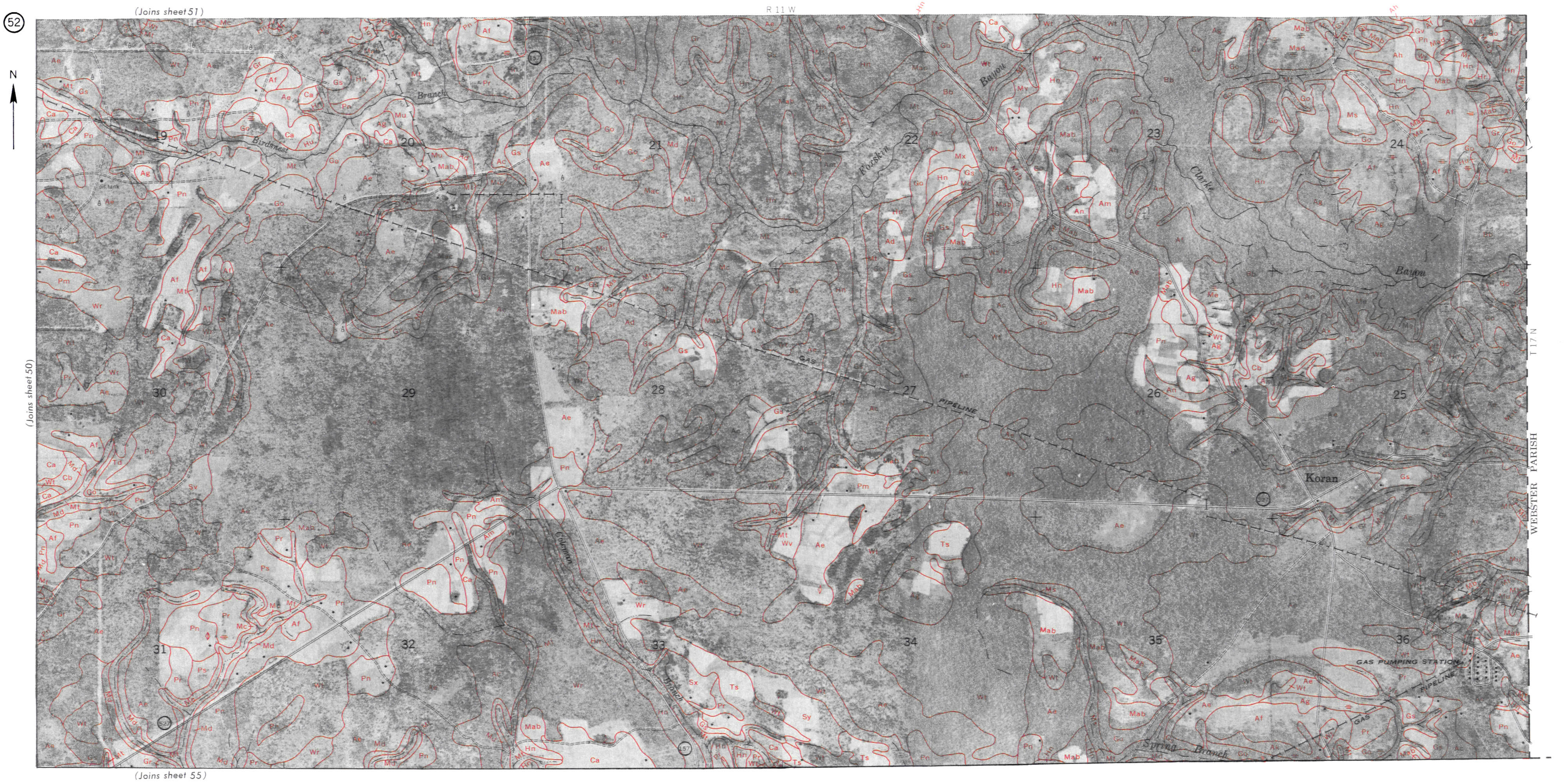
BOSSIER PARISH, LOUISIANA—SHEET NUMBER 50



BOSSIER PARISH, LOUISIANA—SHEET NUMBER 51

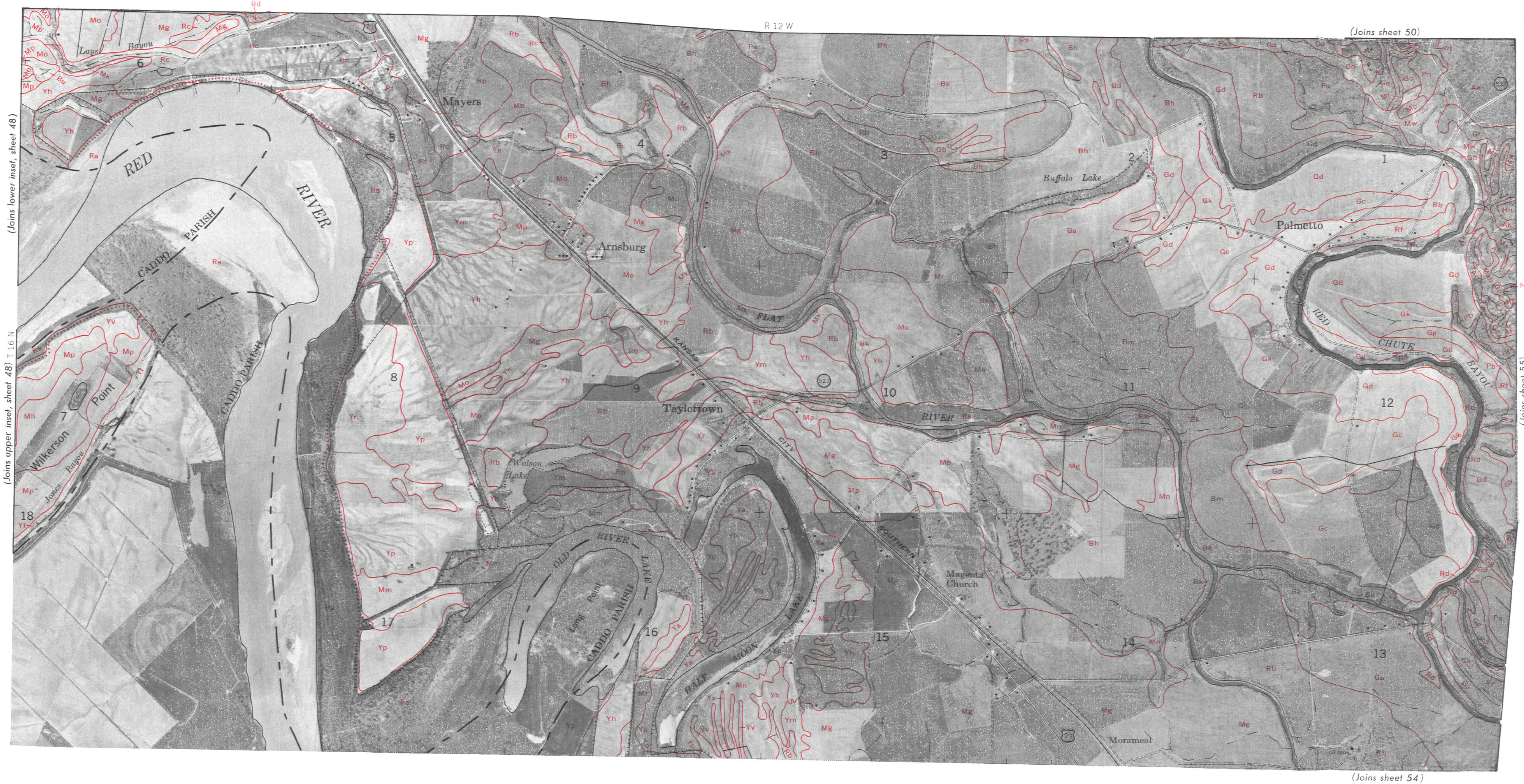


0 ½ 1 Mile Scale 1: 20 000 0 5000 Feet



0 ½ 1 Mile Scale 1: 20 000 0 5000 Feet

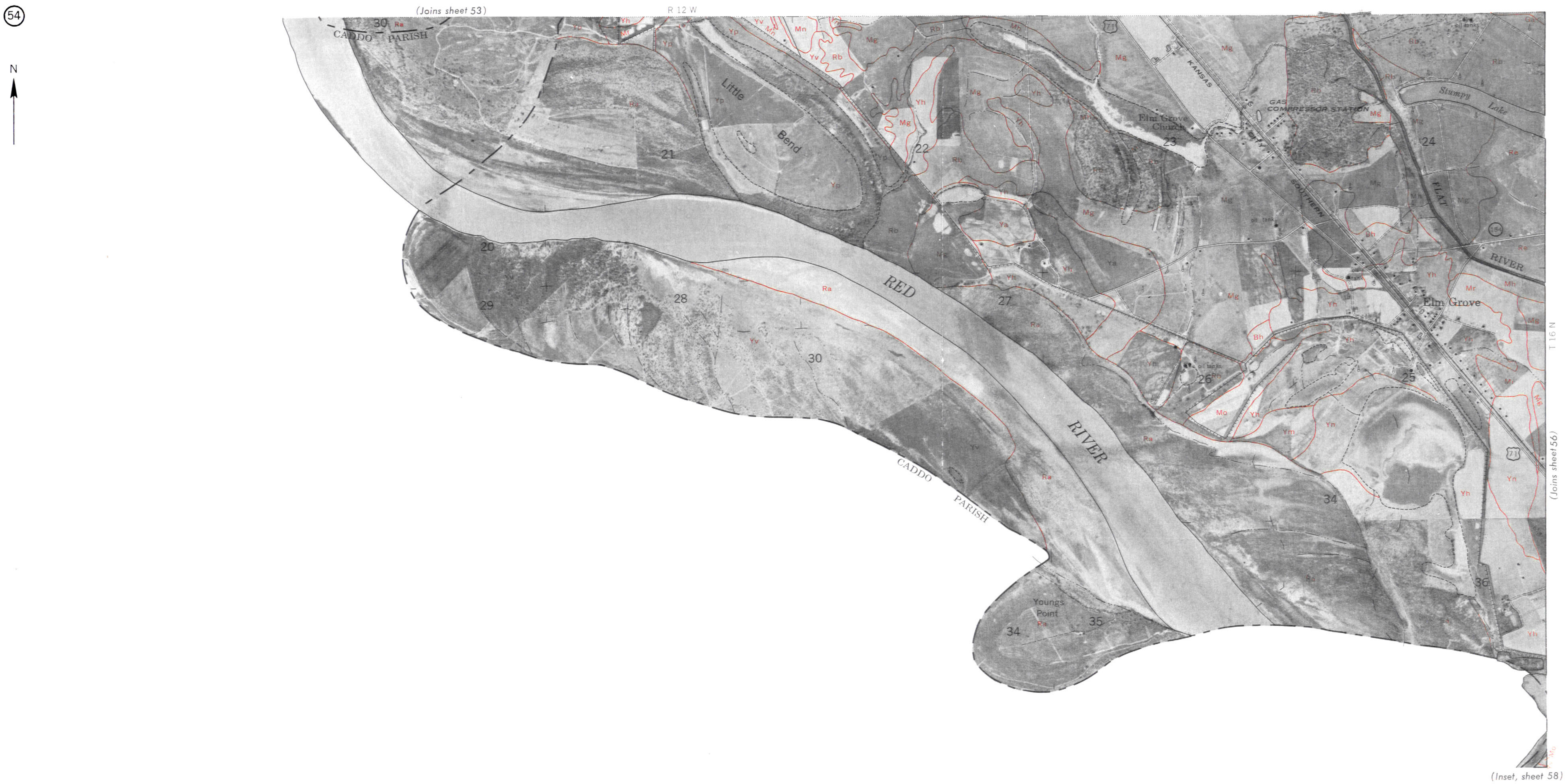
BOSSIER PARISH, LOUISIANA—SHEET NUMBER 53



0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

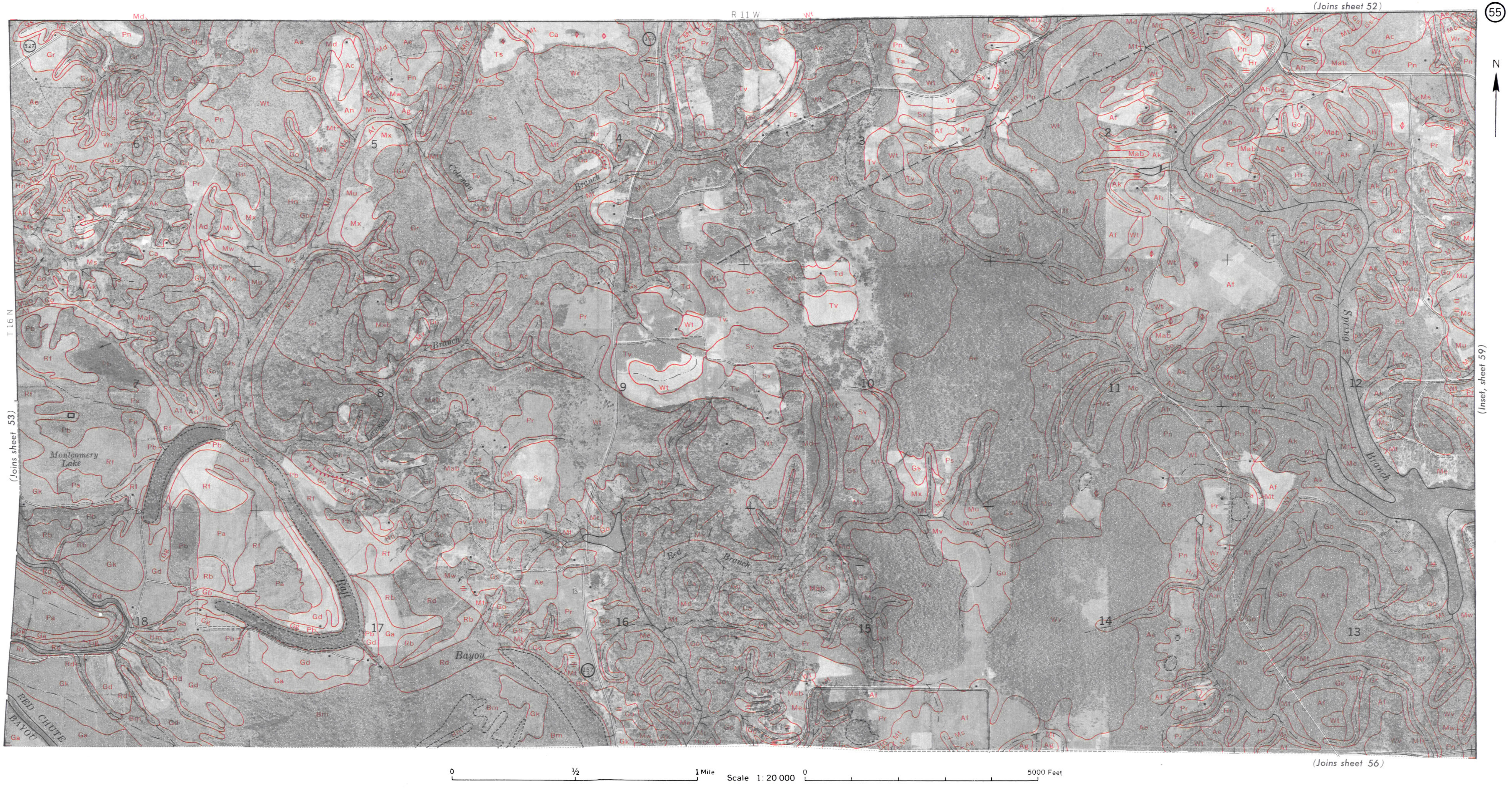
BOSSIER PARISH, LOUISIANA—SHEET NUMBER 54

(54)

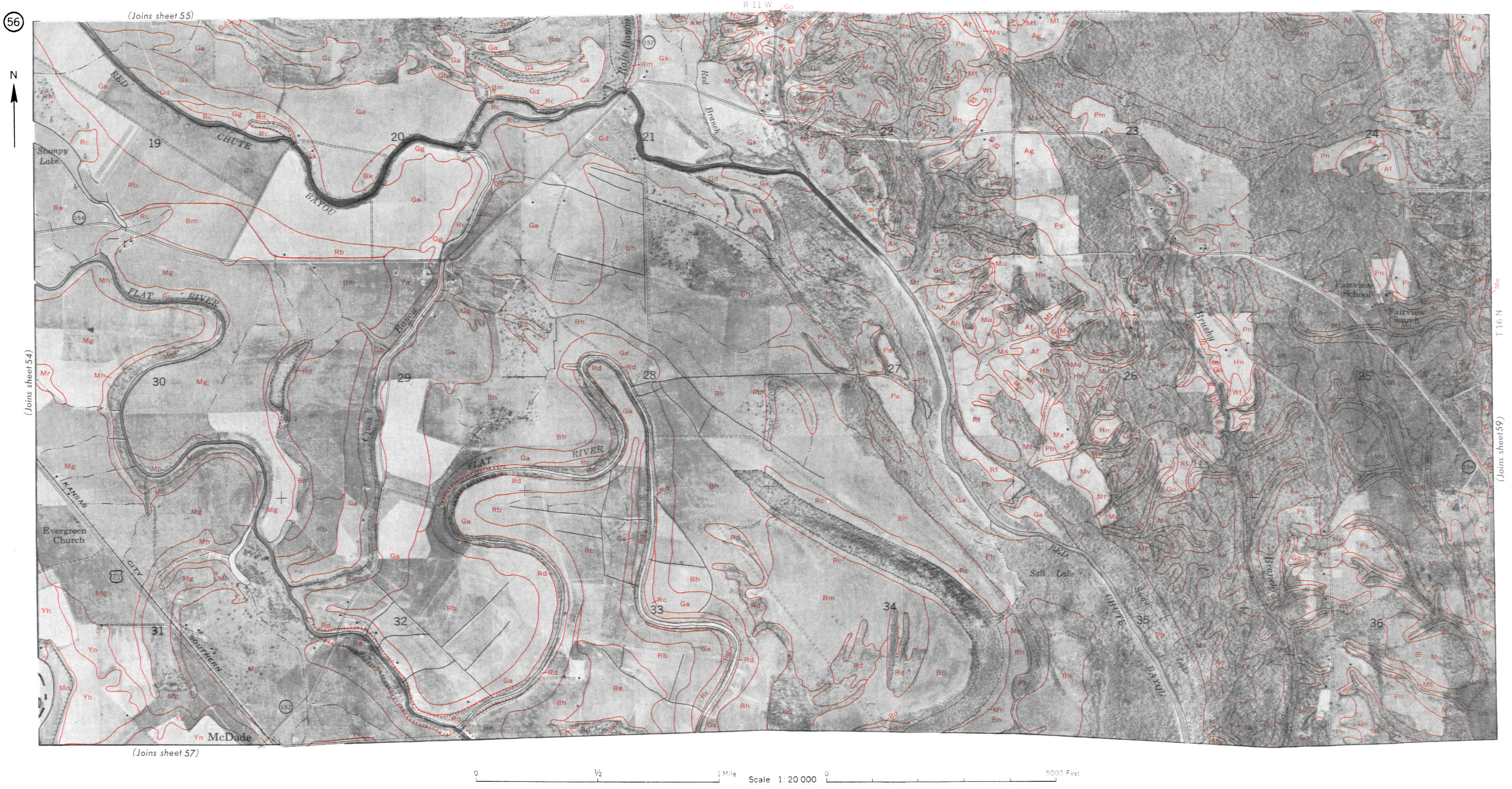


0 ½ 1 Mile Scale 1: 20 000 0 5000 Feet

BOSSIER PARISH, LOUISIANA-SHEET NUMBER 55

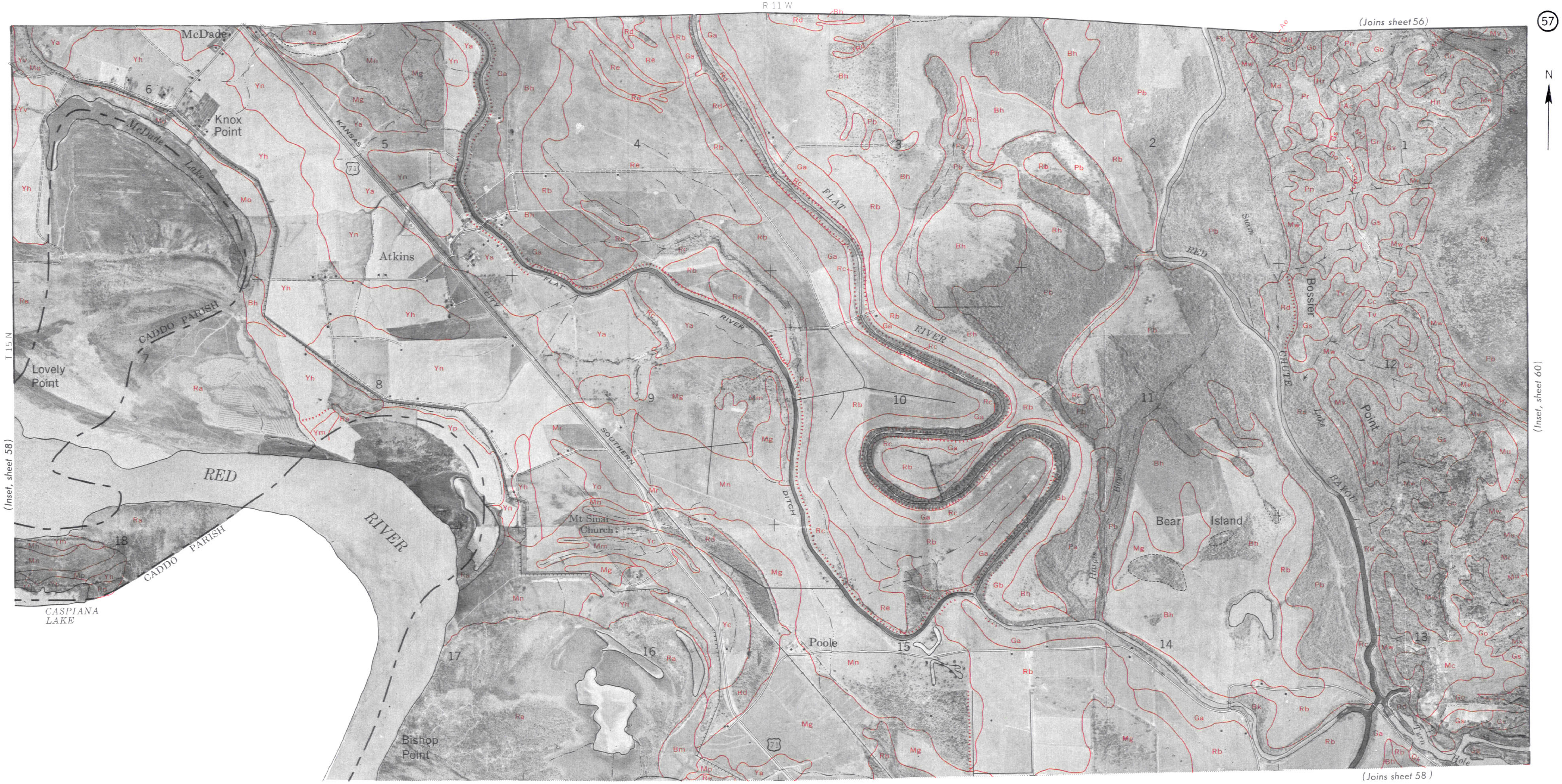


BOSSIER PARISH, LOUISIANA—SHEET NUMBER 56



BOSSIER PARISH, LOUISIANA - SHEET NUMBER 57

(57)

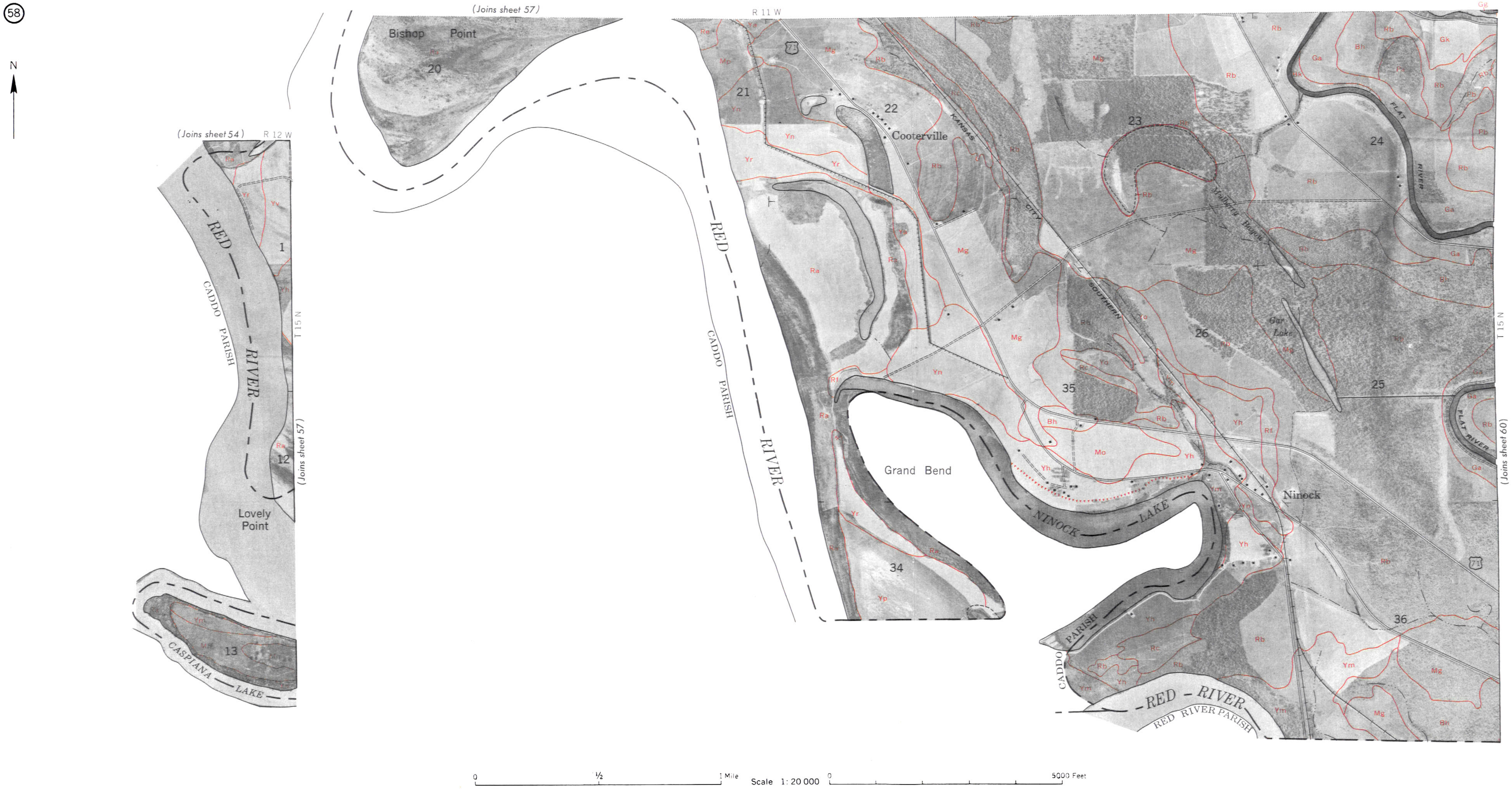


0 ½ 1 Mile

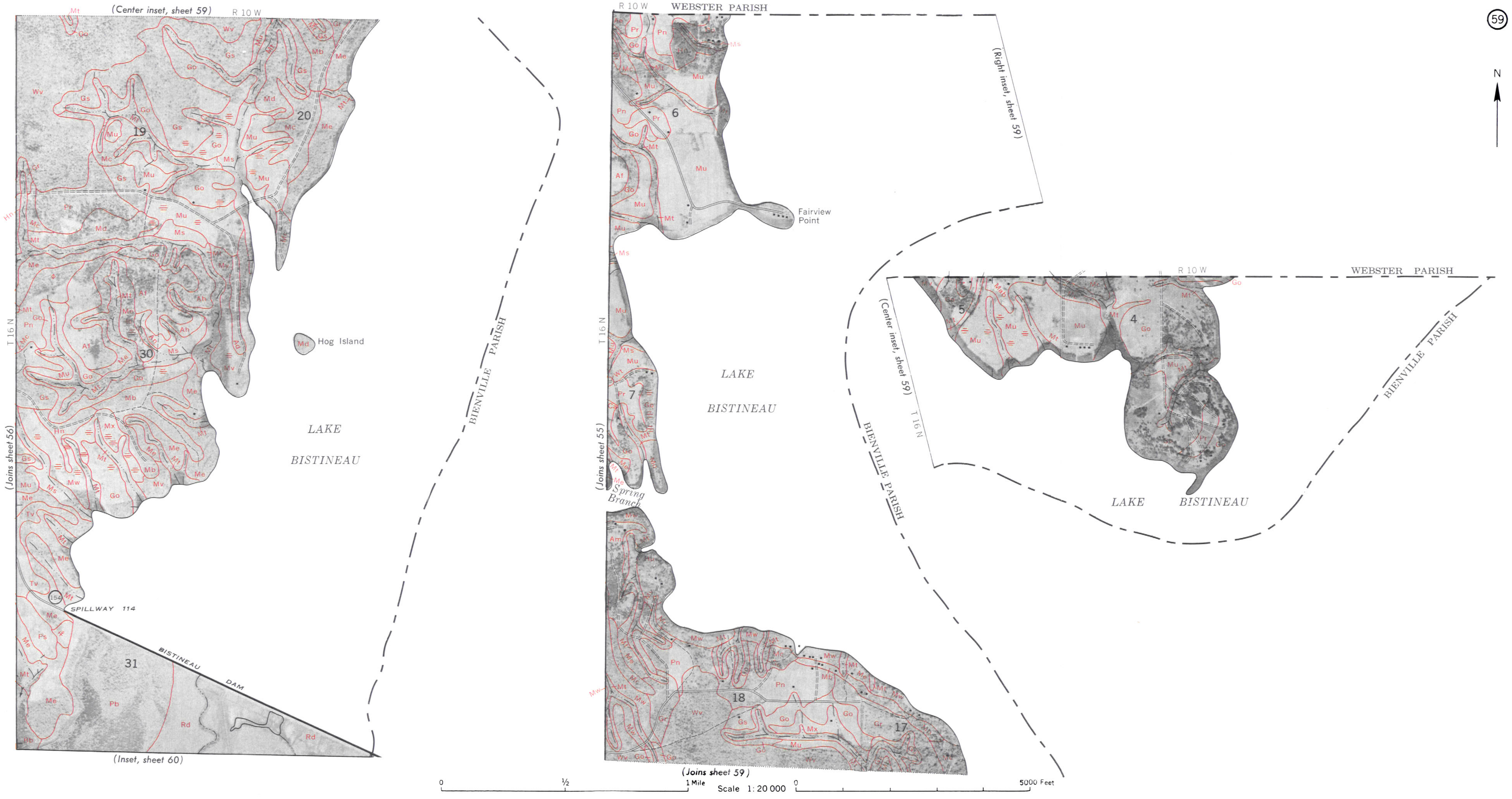
Scale 1: 20 000

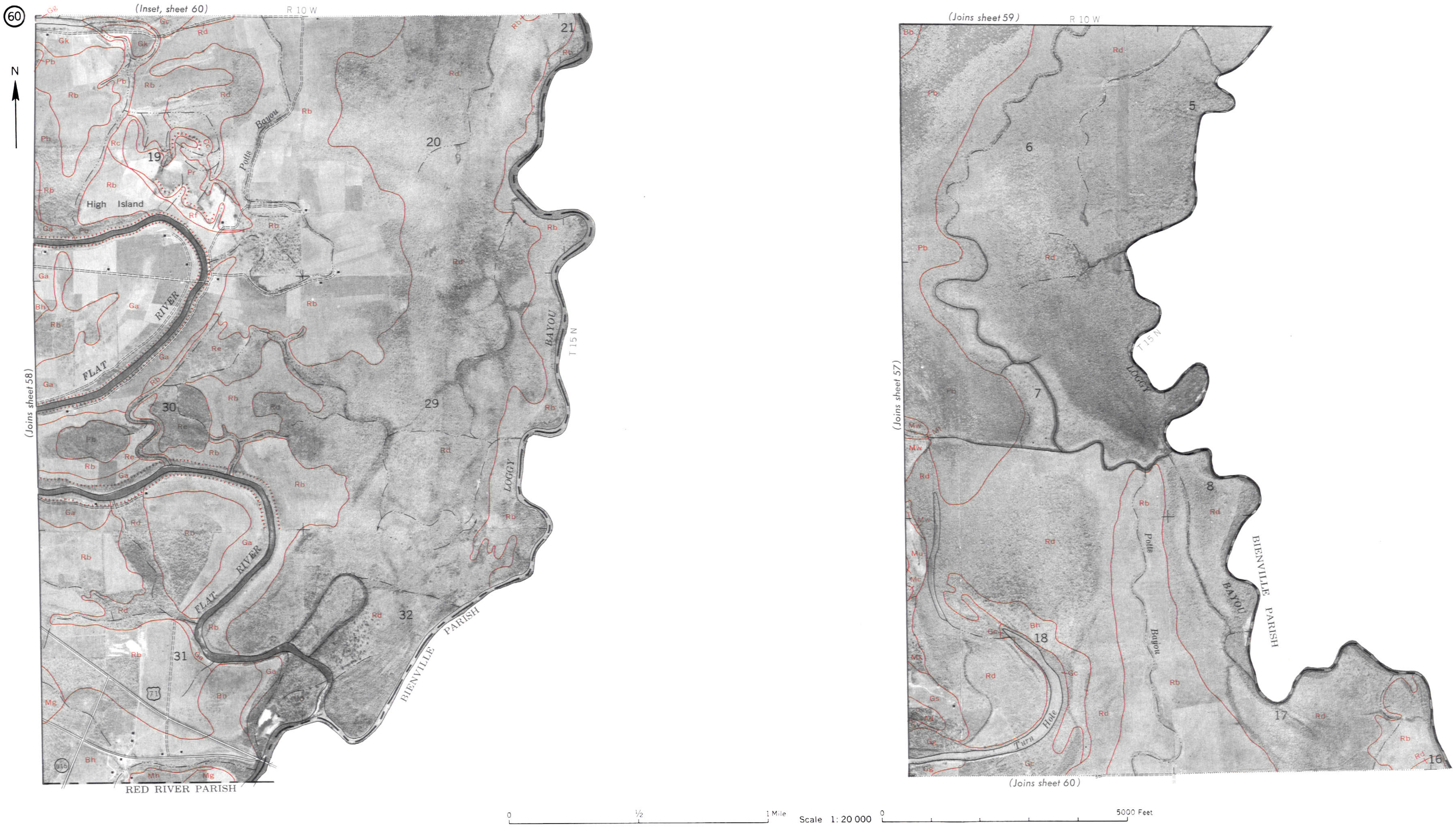
0 5000 Feet

BOSSIER PARISH, LOUISIANA–SHEET NUMBER 58



BOSSIER PARISH, LOUISIANA – SHEET NUMBER 59




60
(Inset, sheet 60)
R 10 W
N
(Joins sheet 58)
High Island
Potts Bayou
FLAT RIVER
LOGGY BAYOU
T 15 N
BIENVILLE PARISH
RED RIVER PARISH
71
516
19
20
21
29
30
31
32
Gk
Gc
Rd
Pb
Rb
Rc
Pr
Rf
Rp
Ga
Bh
Re
Mg
Mh
(Joins sheet 59)
(Joins sheet 57)
(Joins sheet 60)
Bb
5
6
7
8
16
17
18
Mw
Mc
Gs
Turn Hole
0
½
1 Mile
Scale 1: 20 000
5000 Feet